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SOCIOECONOMIC DETERMINANTS IMPACTING
AIR FORCE OFFICER RETENTION

by

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Socioeconomic Determinants Impacting
Air Force Officer Retention

by

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First Lieutenant, United States Air Force
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Submitted in partial fulfillment of the
requirements for the degree of

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ABSTRACT

This thesis analyzes retention and attrition behavior of Air Force captains with four to 11 years of service, extracted from the 1985 DoD Survey of Officer and Enlisted Personnel. All occupations were examined except medical, dental, nursing, chaplain, and legal professions.

Logistic regression models were estimated for all officers. These models included demographic, attitudinal, and economic data. The results showed that as Air Force captains with four to eleven years of military service gained more experience, they were more likely to leave the military. Total family income was found to have a negative effect on retention. Separate models estimated retention behavior by marital status and gender. Gender and total family debt were significant for married officers. The models contrasting men and women indicated that advanced degree attainment had a negative impact on female retention.

The predictive capabilities of the models were evaluated. Recommendations for follow-on studies also discuss limitations of this analysis which may be addressed in future DoD surveys.

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I. INTRODUCTION

A. BACKGROUND

Today, the military is confronted with many of the same issues that the civilian community encounters; one such concern is the excessive turnover of quality personnel. Employees weigh many considerations before making a decision to leave a particular job. A somewhat representative list of these factors includes the actual work environment, career satisfaction, family influences, and alternative opportunities. Employers hope to better understand and control for a portion of this inexhaustible list of influences. With management now perceived as a science by academics and professionals alike, private sector firms have attempted to develop preventive programs in order to keep turnover and disruption to a minimum.

As noted by Knapp, et al., [Ref. 1], researchers from all fields of study including economists and social scientists, have seriously investigated employee turnover behavior. Each group has attempted to find some explanatory relationship between turnover and selected exogenous variables. Their endeavors are in hopes of aiding employers in detecting pre-symptoms, and ways to deal with these problems. Knapp, et al., also noted that over one thousand studies pertaining to turnover have been conducted. This

citation further illustrates the increasing interest by both the public and private sectors in achieving decreased employee attrition.

& The increase in turnover research in the military and civilian communities may be attributed largely to several socioeconomic shifts in recent history. Ehrenberg and Smith [Ref. 2] cite the increase in the number of women entering the labor market as more than doubling in only 30 years time. This phenomenon has dramatically altered the traditional family structure of the single income household, consisting of the non-wage earner (typically the woman) opting for household production.¹

Another trend noted by Ehrenberg and Smith is the decision of men to have shorter career paths. They showed how the numbers of younger men and those at retirement eligible ages have been dropping since 1900. Young men are now entering the labor market later in life, which may be attributed to their desire for advanced education or indecision concerning establishing a career. Alternatively, older workers are opting to retire at earlier ages, possibly due to a greater demand for leisure activities. A combination of these factors contributes directly to increased employee training costs and lost worker productivity.

¹An individual who performs the household production is not included in the labor force, and the primary responsibilities consist of child care, cooking, cleaning and other associated tasks.

Along with the declining youth cohort, the culmination of these recent trends has forced employers to compete for a shrinking, more volatile labor market. Their ultimate goal, and that of the military, is to attract and maintain the highest quality employees possible. In doing so, employers have begun to focus on the needs of the subordinate to assess the possible determinants of dissatisfaction and turnover.

B. SCOPE OF ANALYSIS

Past studies have looked at various aspects of turnover and the process an individual goes through to decide to quit a particular job or migrate to another locale. Researchers have examined many possible explanatory variables, including:

- Economic Factors (eg: Unemployment Rates, Compensating Wage Differentials, Fringe Benefits, Opportunity Costs, etc.)
- Job Satisfaction
- Affiliation with a Company
- Family Influences

NOTE: This list is not exhaustive. There are many factors that contribute to any decision, which may be excluded from a study due to limited data, oversight, or convenience of the analyst.

The final item noted above, family influences, has rapidly moved to the foreground as a key element in turnover modeling. One of the primary reasons for this may be due to

the tremendous increase in women entering the labor market, as cited earlier [Ref. 2]. Since the family unit is changing in its socioeconomic structure to include dual-income couples, research efforts have incorporated qualitative and quantitative methods to capture any correlative associations with voluntary turnover.

Consequently, this analysis focuses primarily on these determinants, and the role the family-structure may play in the retention decisions of officers. Specifically, the data sample consists of Air Force officers. Many military studies examine the attrition behavior of enlisted personnel, while minimal effort has been placed on officer retention. The attrition rates are not as well publicized for officers, but similar considerations must be made as to the costs and lost productivity incurred by the military in failing to retain quality personnel.

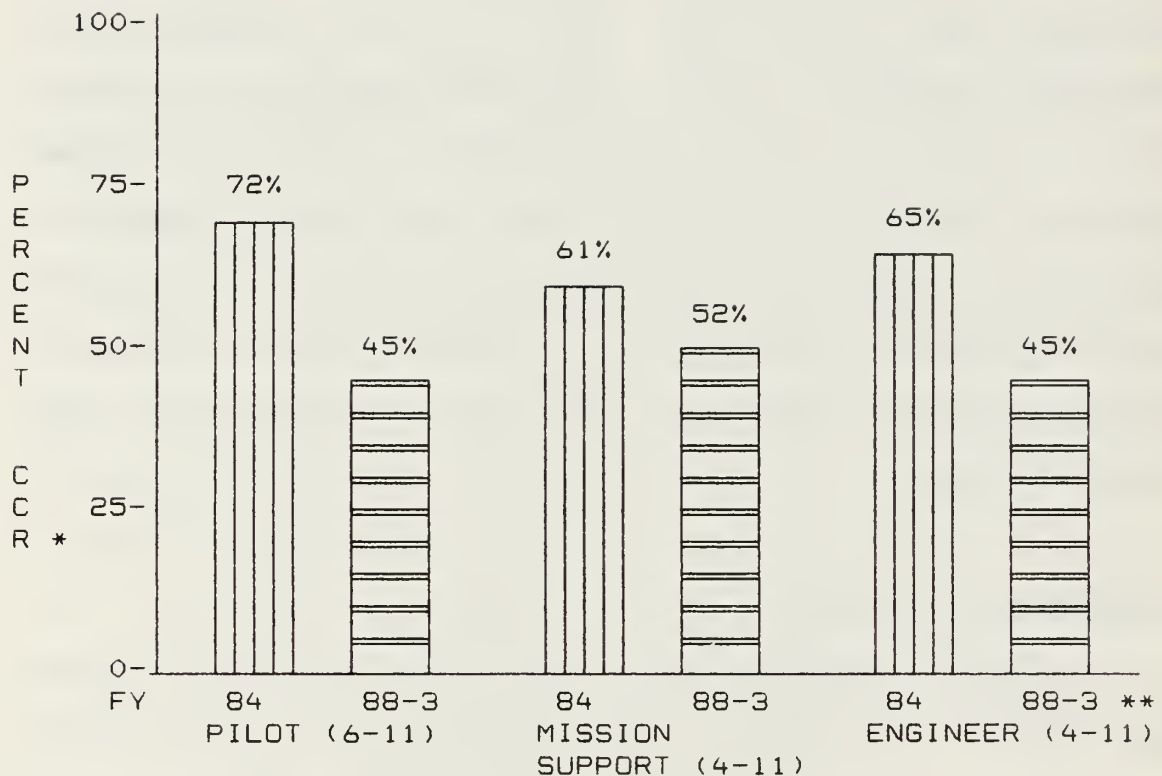
Retention rates for Air Force officers, as for the other services, may be broken out into various categories. The reasons for notable differences between officer groups is fundamental in nature. Many factors such as the state of the economy may contribute differently to pilot retention than they do for mission support officers, for example.¹

¹Included in the retention figures provided by the Air Force Military Personnel Center (AFMPC) are officers in the ranks of Lieutenant Colonel and below, who are not pilots, navigators, operations, legal, medical, or dental personnel. [Ref. 3]

Figure 1 provides a comparative illustration of retention rates for Air Force Officers in three occupational categories. The most current rates are compared with those available for Fiscal Year 1984 (FY84). Figure 2 also contrasts retention rates of selected officer groups (pilots, mission support, and engineers), comparing married and single members. As noted, married officers appear to have higher retention rates than single members. Review of past literature, addressed in Chapter II, will aid in hypothesizing the expected relationship between turnover and marital status.

C. RESEARCH QUESTIONS

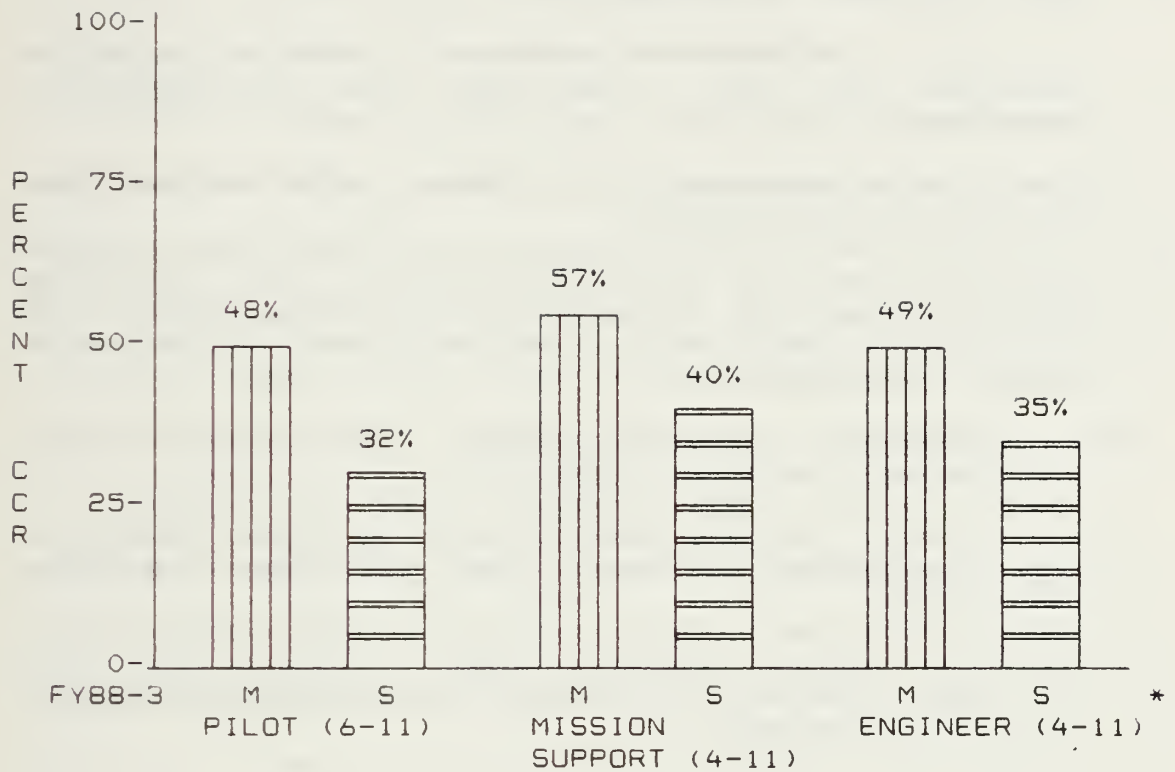
Military members, like their civilian counterparts, must weigh all options when deciding what career path to take. The principal question asked here is, "What factors contribute to an officer's decision to stay in the military or leave?" Many exogenous influences have both individual and correlative causal relationships to retention decisions. Utilizing past studies, specific hypotheses are suggested which address possible variables for inclusion in the theoretical model. The following concerns are somewhat representative of the determination process a military family must make in deciding to stay or leave the military.



* As described by AFMPC, the cumulative continuation rate (CCR) includes the percentage of all officers beginning in a particular year group (eg: 4-11 years for Mission Support, and 6-11 for Pilots), who survive to the end of the period assuming current trends continue.

** The percentages indicated for FY88-3, include retention rates through the third quarter only. [Ref. 3]

Figure 1, Air Force Officer Retention
(Contrasting Pilots, Mission Support, and Engineers)



* (M) Denotes Married Officer
 (S) Denotes Single Officer

NOTE: The percentages obtained for both Figures 1 and 2 were extracted from the 30 June 1988 Quarterly Officer Retention Report, provided by AFMPC. [Ref. 3]

Figure 2, Air Force Officer Retention
 (Marital Status Comparison)

- The first question may be derived directly from Figure 2, addressing whether marital status plays an influential role in the decision process.
- If a member is married, what impact will a new assignment relocation have on the spouse opting for employment or career enhancement?
- Does the officer's personal job history, such as paygrade and time in service, have any bearing on retention?
- What role do dependents (not including the spouse) play in the decision process?
- Does the age of the children have a bearing on the decision? (eg: If a dependent is established at a local high school, will the family want to stay until he/she has graduated?)
- Are job/career satisfaction and present family status correlates in attrition behavior?
- Are economic considerations, such as income stability and growth potential, made that may impact retention decisions?
- Does the age and education level of the officer have any significance in relation to finding alternative civilian employment?

Other questions may be asked that relate to the occasional psychic irritants that disrupt the family unit. One such annoyance may result from members (eg: flight-crew members) being sent on frequent temporary assignments. Derr [Ref. 4] pointed out a similar situation encountered by individuals in his study of Navy retention.

The family must adjust to "Daddy" being home for three months and then away for three months. In the case of many other officers, a sea tour may last for two weeks to eight months.

This point, even though it may not be a typical representation of Air Force personnel, illustrates some of the added problems all military families must face. These disruptions and family separations may contribute directly to an officer's decision to separate prematurely.

Another major factor which may contribute heavily to attrition includes receipt of an assignment notification.¹ Members must resolve many questions, such as those mentioned above, before acceptance of the PCS move. This acceptance must take place within seven days of official notification, which may also have a further bearing on a decision to stay.

From the questions addressed above which are certainly not an all inclusive list, several independent variables from the empirical analysis are found that explain retention behavior of Air Force officers somewhat more clearly. The estimation results displayed in Chapter IV provide some explanatory insights to several concerns.

D. PLAN OF THE STUDY

1. Literature Review

Chapter II provides an overview of selected literature pertinent to turnover research. A careful review of economic literature played a critical role in helping to

¹Permanent Change of Station (PCS) orders inform a military member of an imminent relocation to another base, which has world-wide possibilities. Remote assignments may also include family separation for periods of up to a year or more.

establish a foundation for the selection of explanatory variables. Past analyses concerning private sector employee turnover further contributed in validating relevant variables for inclusion in model formulations.

Military reenlistment and retention studies were instrumental in providing insights as to possible public sector behavior patterns, pertaining to extended contractual agreements.¹ Also, analyses of family influences pursued strengths and weaknesses of previous model estimations, to include discussions of proper functional form and quantitative methods employed.

The final section of Chapter II reveals contributions made by researchers, which support the economic theory of turnover behavior. These studies provide significant results and appropriate model specifications that are utilized further in this analysis.

2. Methodology and Model Specification

Chapter III develops the theoretical framework necessary for correct model specification. The basic equation includes the dependent variable which simply consists of the dichotomous decision an officer makes. That choice is either to stay (1) or leave (0) the military. Actual versus intended attrition behavior is also examined.

¹Unlike much of the civilian community which invokes implicit understandings, military members sign contracts of obligated service that range from four years for enlistees to eight years for pilots.

The right-hand-side variables are described in detail. Correct functional form is also considered before any estimations are made; thus, justifying inclusion of appropriate variables in a model associated with other explanatory variables.

The data sample from this surveyed population is discussed in detail. It was extracted from the 1985 DoD Survey of Officers and Enlisted Personnel [Ref. 5]. This survey was instituted by the Defense Manpower Data Center (DMDC), in response to the needs of the Office of the Assistant Secretary of Defense (Force Management and Personnel) (OASD(FM&P)).

Topic areas from the survey are discussed, and an explanation of the final sampled population of respondents is also included. The survey was restricted to active-duty personnel and included a corresponding spouse survey. It was intended as a comprehensive review of families' opinions and demographic information, targeted at military policies and programs.

The description of the selected explanatory variables includes their type, structure,¹ or whether they

¹The structure of explanatory variables may be continuous, categorical, or dummies which represent categories. Dummies are described as binary variables, such as 0 = male and 1 = female.

are proxies¹. The final theoretical discussion examines the potential hypothesized relationships between the selected variables and the dependent variable. This segment defines whether the element has a positive or negative effect on retention behavior.

Alternative multivariate regression techniques are described and compared to determine the "best" methodology for investigating explanatory relationships. The resultant quantitative technique used for estimation is discussed to including why it is more suitable than others available.

3. Retention Analysis

Chapter IV describes the actual model estimated and comprehensive results of the study. The final functional form of the retention model is highlighted including the resultant coefficient estimates. The results are compared with the hypothesized relationships established previously. Any statistically significant relationships are discussed as to their potential impact on retention behavior. "Goodness-of-fit" of the model is also examined.

¹A proxy is an attempt to substitute for an actual variable which may not be readily available. An example may be to substitute age and education for experience, which is difficult to quantify.

4. Conclusion

Chapter V includes a summary of the analysis. Significant results are provided in a brief format, and those findings having possible effects on present policies are reviewed.

Final comments concerning the strengths and weaknesses of this analysis are addressed. Recommendations conclude the analysis, highlighting areas for follow-on studies and possible improvements necessary to correct for any existing limitations.

II. LITERATURE REVIEW

A. PRIVATE SECTOR TURNOVER

In recent years, research efforts have examined many possible reasons for involuntary employee turnover in hopes of shedding some light on ways to keep the disruption to a minimum, while maintaining optimum productivity and efficiency. Until the last five years or so, turnover research was somewhat limited in modeling and statistical adequacy. Today however, econometric modeling techniques such as multivariate regression and logit analysis have been incorporated in many of the more recent studies.

An example of some preliminary non-technical work is a paper by Kushell [Ref. 6], who explained that employee satisfaction was a major contributor to an effectively run business. He pointed out that companies must compete for a shrinking labor supply of high quality people by attracting them with increasingly competitive salaries, benefits, and other incentives (bonuses, etc.); however, these same recruited individuals had increasing turnover rates reaching some 35%.

Kushell felt the reason for these excessive turnover rates was directly due to the conditions of the work-place. Top management must consider all elements pertaining to the job in order to maintain effective, productive employees.

He included possible indicators that could help isolate and correct potential turnover problem areas.

- What type of person is leaving (includes marginal performers, and top personnel)?
- What are the differences between those who survived in the company and those who did not?
- Could people have been retained with better managerial assistance?

Issues such as these touched on by Kushell are of concern to any organization. As a consequence of asking such fundamental questions, quantitative methods have been incorporated into the area of employee attrition in hopes of establishing some causal relationship.

Michaels and Spector [Ref. 7] tested a model developed by Mobley, et al., in an attempt to make a further determination as to what motivates employees to quit. The model was estimated using path analysis.¹ From the preliminary results, they found salary, job tenure, and personal level within the organization to be insignificant. Consequently, they eliminated these variables from the final estimation. They kept only the variables they felt contributed to an individual's overall satisfaction and commitment, which ultimately conveyed turnover behavior. These significant

¹As stated by Michaels and Spector, their procedure incorporated a step-wise regression format on all the independent variables. Each variable was weighted by its relative importance, and structurally ordered in the final model corresponding to its level of statistical significance.

variables included age, job satisfaction, and perception of work related tasks. As they revealed, the model had limited predictive power, capable of explaining 19% of the variance.

The methodology used by Michaels and Spector is somewhat suggestive of past social science based studies. Statistical significance is lost by eliminating variables arbitrarily from a model. Even if a variable is insignificant, it may still have some explanatory relationship to the dependent variable in the equation. As Studenmund and Cassidy [Ref. 8] suggest, omitting relevant variables from an equation may cause specification bias to occur.¹

Arnold and Feldman [Ref. 9] utilized multivariate regression analysis in establishing a relationship between turnover and selected explanatory variables. Demographic data, job-related variables (tenure, satisfaction with work, potential alternatives, etc.), and intention of the individual to seek other employment were included in the model. They found that the variables relating to the job had significant explanatory power for the dependent variable, intent of an individual to find other employment.

Lamboni [Ref. 10] utilized a similar model, and improved on it by applying probit analysis. Lamboni's final

¹Omitting explanatory variables in order to gain a model with significant statistical results may lead to specification bias. Also, the included variables may no longer be independent of the stochastic error term. This violates the Gauss-Markov Theorem, of "best linear unbiased estimators". [Ref. 8]

model displayed fairly accurate predictions of reenlistment decisions, correctly classifying 70% to 76% of the individuals in the study.

Knapp, et al., [Ref. 1] also noted that previous studies used somewhat primitive methods of relating turnover decisions to individual explanatory elements. One such method indicated was the use of cross-tabulation. Psychologists have often used this technique to provide some insight into individual behavior. Knapp, et al., also felt that employing Ordinary Least Squares (OLS) multiple regression analysis was inefficient due to the limitations placed on the dependent variable.¹ Consequently, they applied logit analysis to their study of employee turnover, which at that time was a relatively new modeling tool.

Knapp, et al., looked at several aspects of turnover behavior of social workers employed in Great Britain who, as they noted, have been known to display extremely high attrition rates. Their results indicated that the largest percentage of leavers (87%) were under the age of 29, and 74% of the sampled individuals with a length-of-service of less than two years departed. Women were also found to have

¹As stated by Pinyck and Rubinfeld [Ref. 11], econometric modeling results in a heteroskedastic error term by forcing the dependent variable to fall into a range of values between zero and one. This may effect the OLS estimate by underestimating the variance of the resultant coefficients.

much higher attrition rates; and, higher education was related to lower turnover.

These results are consistent with economic literature, illustrating the propensity of younger adults to discount the benefits received from future economic potential more highly than older workers. These individuals also demonstrate increased migration habits. Women also are entering and leaving the labor force more readily than men, in order to achieve personal goals such as to raise families. It also seems plausible to assume that someone who has attained a higher education demonstrates more maturity and stability, which may be reflected in lower turnover rates. [Ehrenberg and Smith, Ref. 2]

Yogev and Brett [Ref. 12] sampled a large technology based company, and compared involvement levels of dual-income and single wage-earner families. Involvement included household decision-making and child care responsibilities. They employed cross-tabulation methods and found that the sampled dual-income couples tended to participate equally in all responsibilities. They also mentioned that disruption of any established pattern between the two wage earners may re-adjust role obligations. For instance, a new baby may drive one wage-earner out of the labor market; or, a new job may force the couple to migrate to another locale, also causing one of the two to give up valuable employment tenure.

Yogev and Brett found no significant empirical evidence to support shared decision-making for single income families. They felt the sample may not be truly representative of the population. They thought such items as marital satisfaction and shared household obligations should be equal for both groups of people. However, evidence presented by Szoc and Seboda [Ref. 13] suggests the opposite exists. "Traditional" marriages still exist even today, despite the growing number of dual-income households.¹ Yogev and Brett's results may be consistent with economic theory. Family decisions may, in fact, be mutual in a family who shares income responsibilities, but traditional single income families may continue to have a principle decision-maker.

Ehrenberg and Smith [Ref. 2] further highlight this theory. They explain how traditional single-income marriages result in one spouse (usually the husband) being less involved in household production; while the other member primarily tends to maintenance of the household duties. The principal wage-earner is likely to become somewhat detached from making nonpecuniary household decisions. Thus, attention will be focused more on economic concerns.

¹A "traditional" marriage was defined as one in which the spouse (generally a woman) performed the household chores, to include child care; and, major family decisions are not shared. These decisions were the responsibility of the head of the family. A "non-traditional" marriage reflected the sharing of all household responsibilities.

B. ENLISTED ATTRITION RESEARCH

Like the civilian sector, the military has devoted attention to the issue of retaining quality personnel in order to maintain a ready defense posture. A major contributor to this concern was the end of the Vietnam War, when young men were no longer required to serve in the military. The Department of Defense (DoD) recognized a potential threat to maintaining a vital military defense structure. [Anderson, Ref. 14]

Military studies have often focused on the attrition behavior of enlisted personnel. However, few analyses have thoroughly examined the retention of officers. The studies available provide a baseline with which to analyze human capital behavior. Several reenlistment analyses have revealed general insights as to retention decisions, which may be applied to officers as well.

Marcus and Quester [Ref. 15] found several factors to be of significance in establishing estimates of retention rates among young recruits. The ratio of military pay to civilian pay, the overall unemployment rate, and the military advertising budget were found to influence retention.

More recently, analysts have begun to include family elements in their research of retention decisions. Like civilian researchers (Yogev and Brett, Solnick, et al.), the military has learned that retention decisions are not only

based on a member's job satisfaction or even tenure. Other exogenous considerations must be taken into account. As previously mentioned, in a study by Lamboni [Ref. 10], probit and logit analysis techniques were used to analyze reenlistment decisions made by first-term personnel. His main source of data was the 1985 DoD Survey of Officer and Enlisted Personnel, prepared by Hunt, et al., [Ref. 5]. Lamboni divided the analysis into five basic categories, in order to achieve a general explanation of reenlistment behavior. The categories he included were:

- Demographic information
- Job tenure
- Cognitive/affective orientation
- Income and economic incentives
- Perception of civilian employment alternatives

Factor analysis was used to combine several independent variables within the component relating to cognitive and affective determinants. The reduction technique allowed Lamboni to decrease the number of variables to a smaller, manageable size for further estimation, while maintaining explanatory power relating to reenlistment intent.

As Lamboni and others have found, many exogenous variables contribute to the decision made by an individual to separate from the service or to make a contractual agreement which may lead to a career commitment.

C. OFFICER ATTRITION RESEARCH

One study devoted its effort to officer attrition behavior. Sutherland [Ref. 16] looked at the retention rates of Air Force mission support officers with four to 11 years of service. This year group is known to have the highest attrition rates among the officer ranks. Costs required to train and "grow" new officers to fill these vacancies can amount to a considerable sum for both the military and taxpayers.

Sutherland attempted to assess some explanatory relationship between economic indicators and officer attrition and retention. He was provided with five years worth of retention figures by the Air Force Military Personnel Center (AFMPC). He divided this into quarterly data, yielding a total of 20 observations with which to perform the analysis. This data sample raises some questions as to the explanatory power of the final model estimated. The results should be regarded with caution.

Sutherland revealed that the highest losses incurred were for officers with four to five years of service. In lagging the economic indicators as indicated in Table 1, Sutherland showed the following factors to be significantly related to retention behavior.

TABLE 1
LAGGED ECONOMIC INDICATORS IMPACTING
OFFICER RETENTION

ITEM DESCRIPTION	IMPACT ON RETENTION
<hr/>	
LAGGED 0-3 QUARTERS	
<hr/>	
▪ Help Wanted Index	"Not Strong"
▪ Industrial Development Index	"Moderately Strong"
<hr/>	
LAGGED 4-5 QUARTERS	
<hr/>	
▪ Price of Food	"Somewhat Weak"
<hr/>	
LAGGED TO 2 YEARS	
<hr/>	
▪ White Collar Unemployment	"Stronger Relationship" [than price of food]

NOTE: These results represent inflation and unemployment rates from 1973 to 1977.

SOURCE: Sutherland, 1982.

D. FAMILY INFLUENCES ON RETENTION

Of the many external elements which influence an individual's decision to choose a military career over civilian employment, family structure has moved to the foreground as an additional element for consideration.

An individual will weigh many factors, which include such things as economic and personal aspirations, before entering into any commitment. Initial contracts for Air

Force officers now range from four years to eight years for pilot candidates. Additional time is obligated for other programs such as Professional Military Education (PME) and post-graduate education. Costs of training and educating these officers can be extensive to the military. Consequently, analyses have attempted to determine who are potential candidates for early attrition and factors which may be driving these individuals out prematurely.

Szoc and Seboda [Ref. 13] performed a follow-on path analysis¹, which looked at retention as a function of several aspects of the family lifestyle. Principle components included whether the respondent was a single parent, if the spouse was employed, the type of his/her occupation, and whether the marriage was "traditional" or "non-traditional".²

The overall structure of the family was looked at in regards to dependents (other than the spouse). The number of children and the age of the youngest child at home was considered to be of importance. A pre-school age child was likely to require constant adult care, whereas, older children may not need continual supervision. Children in

¹Szoc and Seboda drew from a previous study (Szoc, 1982) using the original survey data, and added behavior variables to the new model.

²As stated previously, a principal difference between a "traditional" and "non-traditional" marriage is that in the former there is only a single wage-earner, while the latter has a dual-income.

their teens or college-age are more likely to be somewhat self-reliant.

In 1979, Derr and associates [Ref. 4] conducted a qualitative survey of Navy officers and their wives. They found that 19% of the surveyed sample of officers claimed their wives were either looking for work or already had a job. The percentages are somewhat different than those presented by Kringer [Ref. 17], who found that 71% of the responding spouses in a 1986 Air Force survey were either employed in some capacity, or wanted to be. These contrasting figures may be due to variances between the services, or they may be more illustrative of the increase in dual-income households in both the public and private sector labor-force. Both wage earners' employment potentials will continue to play a more critical role in the decision process to stay or leave the military.

The statistical explanatory power of the study by Derr, et al., may not be reflective of the entire Navy population due to the limited number of couples polled (25 total). However, along with past studies, their work has helped to direct other researchers in pursuing family-unit studies to determine causal influences on retention.

Black [Ref. 18] cited how the Air Force has recognized the development of the "changing pattern of Air Force families", and ways they have attempted to deal with this transformation. He gave an overview of the initiatives

established by the Assistant for Air Force Family Matters in 1980, which included the following concerns:

- The ratio of military pay to civilian pay should be comparable.
- A central office should be established at each base to serve as a focal point for family matters.
- Medical care should be provided to the family by the same doctor on a continuing basis.
- Child/youth programs should be expanded to provide meaningful programs.
- Working spouses need assistance in obtaining employment information, especially when facing a PCS move.

As stated by Black, the Air Force has begun to deal with other developments relating to family role changes. His study did not include any data sampling or model estimations, but it illustrated how the military has recognized the many family concerns which may be playing a more influential role in a member's retention decision.

Vranken, et al., [Ref. 19] addressed a major Army issue, deployment, and its effects on the immediate family. Of the spouses surveyed, 80% had children, and 50% of the sample had been married less than two years.¹ It was noted that the spouses' attitudes toward the Army and their husbands' careers changed once the husbands were deployed. Their feelings toward the Army shifted from a very positive attitude to a more neutral tone. Thirty one percent of the

¹Men were excluded from the sampled population.

wives felt that the family separation had affected their marriages negatively.

Jacobson [Ref. 20] estimated the effects of PCS moves on the wages of Navy wives. He cited how civilian spouses' wages could be reduced by amounts in excess of one thousand dollars, by a couple making a move to a different metropolitan area. The family may elect to migrate only if the head of the household will receive an income substantial enough to overcome the loss incurred by the move.

Jacobson explained that the Navy (or any other service branch) does not take these external costs into consideration. Alternatively, the family does weigh the various costs imposed by such disruptions. He concluded that the Navy loses short-run productivity from its members being relocated and their lives' being disrupted. Costs due to decreased retention and replacement of members are also suffered, not excluding the actual costs to move an entire household.

Like Jacobson, Vernez and Zellman [Ref. 21] analyzed the stress placed on a family due to deployment practices and living in a regimented society. They examined various family issues, to determine any causal relationship between them and attrition, retention, and readiness. They found that attrition is higher for members who are married or have children, and for those who have not completed an initial contract commitment. In their modeling of the problem,

Vernez and Zellman chose a simplified factor analysis method in order to group questions into general behavior variables. Seventeen family issues were grouped into seven categories, which asked members to rank-order three of the seven reasons why they would separate from the military. Table 2 reflects the composites of the categories.

Results from the survey provide a general picture as to a member's satisfaction with the military, but they do not reveal detailed insights to causal relationships between retention behavior and individual explanatory variables.

TABLE 2
COMPOSITE FAMILY SURVEY QUESTIONS

- Family-Related
(Family Separation, etc.)
- Relocation-Related
(Dislike Assignment, etc.)
- Military Benefits
(Reduction)
- Compensation
(Low pay, Better Civilian Job, etc.)

SOURCE: Vernez and Zellman, 1987.

Smith and Goon [Ref. 22] utilized the 1985 DoD Survey, and presented some preliminary work on the effects of "spouse employment and the retention of Air Force officers". They looked principally at officers' wives, and found that 42% were in the labor force.

They measured the probability of retention decisions, utilizing an Ordinary Least Squares (OLS) regression model.⁴ Several models were estimated, to include such explanatory variables as the officer's personal job history (type, Years-Of-Service, "relative grade"⁵, etc.), spouse employment (type of job, full or part-time, self-employed, etc.), and dependents (number and age).

Smith and Goon's findings revealed that retention rates for officers were lower when their spouses held full-time jobs as compared to wives who held only part-time positions. These effects held true, especially for junior ranking officers. They concluded that these officers are most likely to be affected by their wives' earnings potential.

E. RESEARCH CONTRIBUTIONS

By using quantitative techniques, Szoc and Seboda [Ref. 13] were able to illustrate that a definite negative relationship existed between spouse employment and officer retention. Specifically, if a spouse held a professional

⁴OLS modeling incorporates quantitative methods into the estimation of an econometric equation.

⁵"Relative grade" was calculated by taking the officer's present pay grade and subtracting from it "the average grade for his commissioning cohort." This provides a simplified statistical reference, with which to compare officers with others' earnings potentials. Grades may be uniformly distributed around a mean value of zero to determine those officers within standard deviation units of the mean.

position, the officer was less likely to stay in the military.

The results displayed in Table 3 also showed that dependents influenced officer retention. If a couple had no children, they were less likely to remain in the military. If the family included a pre-school age child, the couple was more likely to remain in the Navy. However, comparing this group with families who had children of ages five to 12 revealed that couples with pre-school age children were more likely to leave.

Szoc and Seboda found more indirect influences on officer retention which included the spouse's opinion, military service variables¹, and Navy treatment of the family. The spouse's opinion was considered to be an important issue, but the difference between those who stayed and the people who left was insignificant. There was, however, a strong relationship between Years-Of-Service (YOS) and spouse attitude toward the Navy. As the number of years in the service increased, the spouse's attitude became more positive toward the Navy.

¹Variables such as Years-Of-Service, job-type, job satisfaction, overseas assignments (number, isolated-remote, and duration), family separation, and Permanent Change of Station (PCS) were included in the model estimation.

TABLE 3
SELECTED FAMILY VARIABLES CORRELATIVE TO
OFFICER RETENTION

FAMILY STRUCTURE	% LEAVE	% STAY	RELATION- SHIP
No Dependents	13.8	86.2	?
Spouse Only	25.2	74.8	-
Child Only	12.5	87.5	+
Spouse & Child	10.9	89.1	+
AT LEAST ONE CHILD			
Yes	11.1	88.9	+
No	23.6	76.4	-
AGE OF YOUNGEST CHILD			
No Children	23.6	76.4	-
Under 5 Years	11.9	88.1	+ *
5-12 Years	6.9	93.1	+
13-18 Years	0.0	100.0	+
Over 18 Years	14.3	85.7	+

NOTE: (?) Mixed relationship to retention.

(-) Negative effect on retention.

(+) Positive effect on retention.

(*) Positive effect on retention, except compared to couples with children ages five to 12.

SOURCE: Szoc and Seboda, 1984.

Szoc and Seboda discovered an additional composite variable to be of significance; the contributor was family satisfaction with the Navy lifestyle. Their estimation also revealed that an officer who intended to stay was more likely to remain in the Navy than an member displaying negative intent.

Vernez and Zellman [Ref. 21] observed that enlistees, who are married with children, increase their chances of remaining on active duty once they have completed their first-term commitment.¹ This indicates increased stability and maturity. They also noted that more frequent disruptions, such as family separation and relocation, have a tendency to impair readiness and decrease retention rates.

Lamboni's [Ref. 10] reenlistment study revealed significant results concerning the types of people who were more likely to reenlist in a particular branch of the service. As noted by Table 4, the reference group consisted of those individuals less likely to reenlist. For instance, non-whites were more likely to reenlist than whites.

In an analysis by Solnick [Ref. 23], employee turnover focused on women and the effect of them having children. The database he used consisted of 1400 employees from a single company.

¹A first-term enlistee is usually obligated to serve in the military for a period of four to six years. Upon completion of the first-term, he/she is considered a careerist.

TABLE 4
REENLISTMENT BEHAVIOR

LIKELY TO REENLIST	REFERENCE GROUP (Less Likely)
Non-White	White
Household with Dependents	No Dependents
Occupation (Non-technical, Administration, Supply, Medical, and Dental)	Occupation (Technical)
Satisfied with Military Life	Dissatisfied with Military Life
High Debt	Low Debt
Spouse Earnings (High)	Spouse Earnings (Low) *
Low Chance of Finding Civilian Job	High Chance of Finding Civilian Job

* Found to be significant for Navy and Marines only.

NOTE: For Air Force respondents; personnel in supply and administration support were less likely to reenlist; age was found to have a negative affect on reenlistment (10% level of significance); and promotion opportunity had a positive effect on reenlistment (1% level of significance).

SOURCE: Lamboni, 1987.

Solnick's basic model estimation incorporated logit analysis on the binary choice to quit or stay with the firm. He created a proxy for the "stay" variable, which contained the theoretically expected utility from being employed. The proxy included actual wages earned, marital status, and the number and age of children in the home.

The study revealed that married women were more likely to remain employed than single women. As applied to the military, this evidence suggests that a couple making an economic choice to have a dual-income may be less willing to give up that earnings potential. If the decision pertaining to reassignment is imminent, a couple may wish to stay at their present location, as opposed to risking the spouse not being able to secure new employment in a less populated metropolitan area.

Solnick's results concerning having children and making employment decisions seem consistent with economic theory, as suggested by an individual's reservation wage.¹ Women caring for pre-school age children, and those with children over the age of 16 were found to be more likely to quit. These latter results were not statistically significant, however. Solnick recognized that this lack of significance

¹Ehrenberg and Smith [Ref. 2] explain that the "reservation wage" is that which is required to induce someone to enter the labor market. The wage potential must be high enough to compensate an individual for the decrease in household production, and increase in child care costs (if applicable).

may be due to the model specification. Combining married and single women into one group may have been inadequate, but as he explained, estimations using only married women terminated with insignificant results.

The results contributed by Solnick were consistent with those found by this author in a similar research effort [Ref. 24]. A logit model was specified which included age, education, and experience as explanatory variables. The dependent variable consisted of the dichotomous decision of Air Force officers' wives to be employed or not employed at the present time. The age of the youngest child at home (pre-school) was found to have a significant negative relationship to the wife being employed.

If a military household consists of a non-working spouse and a pre-school age child, it seems reasonable to assume that the officer (member) will be more likely to remain in the service to maintain economic stability. This family factor may be an additional consideration in retention decisions.

III. METHODOLOGY AND MODEL SPECIFICATION

A. SCOPE AND OBJECTIVES

A theoretical framework for estimating relationships between officer retention and the hypothesized explanatory variables was developed from the literature reviewed in Chapter II. This thesis focuses on the following categories of explanatory variables:

- Demographic
- Work-Related
- Family Influences
- Economic Factors
- Career Related

The sampled population is limited to those officers who have been a major concern to Air Force leaders due to their high attrition rates [Ref. 3]. Specifically, the groups of officers looked at are non-rated individuals with four to 11 years of service, and rated officers with six to 11 years of service.⁴ These groups of officers are more likely to separate than officers beyond the eleven year point, who have presumably chosen the military as a career. Since officers with less than four years of service have an

⁴Rated officers are either pilots or navigators. The remainder consist of mission support officers, operations, and engineers.

initial obligation of service to complete, they were also excluded from the sample.

The model estimation addresses the dichotomous retention decision made by officers, that being to stay or leave the military. Since affiliation intention has been known to have a correlative relationship to retention, this variable is also examined in conjunction with the retention decisions made by officers who have actually left the Air Force.

B. DATA COLLECTION

The data used for this analysis were extracted from the 1985 Department of Defense Survey of Officer and Enlisted Personnel [Ref. 5], provided by the Defense Manpower Data Center (DMDC). The survey was conducted to provide information for each of the services to help improve force readiness and retention. The Office of the Assistant Secretary of Defense (Force Management and Personnel) (OASD (FM & P)) mandated that a survey be conducted, with considerable emphasis being placed on the military family structure.

Table 5 illustrates the nine major areas covered in the 1985 DoD Survey. Questions asked of both officers and enlisted personnel were identical in content. The stratified sample consisted of active duty personnel from all the services, and their households. Two surveys were actually conducted, which looked at members and spouses of those who were surveyed. As suggested by Table 5, questions focused

on the quality of military life and issues pertaining to retention intent.

The sampled population included a cross section of officers and enlisted personnel who were stationed within the Continental United States (CONUS) or overseas as of 30 September 1984, capturing an effective sample size of some 125,000 households.

The sample data extracted for this analysis initially contained approximately 7,900 Air Force officers, with a response rate of 82%. Most of the questionnaires were returned by 31 March 1985, which indicated that the respondents had accumulated ten additional months of service. After eliminating officers who had less than four years of initial obligated service and those with over 11 total years at the time of the survey, 31 lieutenants remained. Under normal circumstances, these officers should have been deleted from the sample.¹ Since there was no apparent reason for these individuals to remain in this cross-sectional group of officers, an arbitrary decision was made to delete them from the analysis.

¹Normal promotion time for Air Force Lieutenants consists of two years from Second to First Lieutenant, and two years from First Lieutenant to Captain. Some officers are deferred for promotion for various reasons, to include administrative action.

TABLE 5

PRINCIPAL QUESTIONNAIRE TOPIC AREAS FROM
THE 1985 DOD SURVEY OF OFFICERS AND ENLISTED PERSONNEL

- Military Information -- Service, paygrade, occupation, obligated service, procurement program.
- Present and Past Locations -- Time at present location, expected time remaining, overseas, costs and difficulties associated with PCS, number of moves.
- Career Intent -- Expected years of service, highest paygrade expected.
- Individual and Family Characteristics -- Age, education, sex, race, marital history.
- Dependents -- number, ages, whether or not dependents are handicapped.
- Military Compensation, Benefits and Programs -- Asked about benefits received by respondent, Family Support Centers, marriage counseling, Chaplain services, spouse employment services, legal assistance.
- Civilian Labor Force Experience -- Amount earned from second job, contribution to household, self-esteem, enjoyment.
- Family Resources -- Spouse income, sources, expenses, debt, savings, non-wage income sources.
- Military Life -- Personal freedom, pay and allowances, job security, work conditions, overall satisfaction with military, and personal comments or recommendations.

Once this group of four to 11 year Air Force officers was established, an attempt was also made to capture only those individuals who had less than one year of obligated service remaining.¹ It was felt that individuals with less than a year remaining on their ADSC were within an acceptable period with which to make a retention decision. If an individual is contemplating any career options, he/she may begin planning or searching for alternatives as much as one year prior to actual separation. Officers with more than one year of committed service remaining may also request waivers to possibly separate early; yet, this action remains subject to approval from AFMPC.

Officers who had less than one year remaining on their current overseas assignment, those who had been at their present CONUS assignment for a year or more, and majors and above who had maintained their present paygrades for more than two years were addressed in this process. As there are numerous ADSCs which could not be readily accounted for in this survey, only the primary candidates capable of incurring service obligations were included.

Air Force Specialty Codes (AFSCs), which describe officer occupational categories, were used to determine the

¹Military personnel incur Active Duty Service Commitments (ADSC), which result from such actions as PCS moves, education, training, and promotions. Air Force Regulation 36-51 [Ref. 25], displays some 11 tables which address these ADSCs and the obligated periods associated with each.

types of occupations these officers held. The frequency distribution showed that less than 5% of the sample represented medical, dental, nursing, chaplain, and legal fields. It is hypothesized that these professionally skilled areas do not have similar retention patterns as the remaining occupational skills. Therefore, they were deleted from this analysis in order to capture a more homogeneous group of officers. Upon the extraction, captains represented 98% of the sample, as expected of a typical group of four to eleven year officers. It is possible that the 2% of majors and lieutenant colonels remaining were the exceptional performers within the sample, yet that information was not provided from the survey. Consequently, the entire group of higher ranking officers was also deleted from the analysis.

The final sample size amounted to 1,089 respondents, 33% of which were female. This indicates that women were more heavily sampled in this group of officers since they accounted for only 28% of the respondents in the overall survey. This tentative database was of a statistically adequate size for making inferences from the survey results to the Air Force officer population with four to eleven years of service.

C. METHODOLOGY

The final model was estimated using binomial logit analysis. This technique works for dichotomous dependent

variables, such as the decision made by officers to stay in the military or leave. Logit analysis is based on a cumulative normal distribution which allows the resultant value of an estimated probability to lie in a range from zero to one, without any restrictions being placed upon it. [Afifi and Clark, Ref. 26]

The actual model to be estimated is assumed to have the following functional form:

$$\text{Ln} (P_i/1-P_i) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni} + \epsilon_i$$

The estimated value for P_i may be interpreted as the probability that an officer will stay in the military. The values for each X_{ni} are the actual observations for the respective variables from the sample data, while each β_n represents the estimated coefficient associated with X_{ni} . The constant term (β_0) and the stochastic error term (ϵ_i) complete the equation.

D. HYPOTHESIZED EXPLANATORY VARIABLES

Variable selection relies on economic theory discussed in the literature review. As mentioned earlier, explanatory variables were aggregated into five principal categories similar to the research efforts of Arnold and Feldman, and Lamboni. Each group is addressed as to its hypothesized relationship and impact on turnover decisions of officers. The explanatory variables are listed in sequential order

corresponding to the question numbers taken directly from the 1985 DoD Survey.

1. Demographic Variables

The initial variables needed to build this econometric model include basic biographical data to help distinguish between groups of people. It is hypothesized that women have higher turnover rates than men. They are more likely to leave the labor force to raise a family (Ehrenberg and Smith, 1988).

The hypothesis pertaining to age suggests that the older and more mature an individual becomes, the less likely he/she will move from job to job. An individual will realize less expected future benefits from the search time and wages sacrificed in order to find and rotate to a new job.

Individuals were also categorized by race, and the data were subsequently partitioned into two groups, "non-white" and the reference group of "white". The survey revealed that 87% of the sample were white while the remaining 13% included all of the following: "American Indian / Alaskan Native", "Black / Negro / Afro-American", "Oriental / Asian / Chinese / Japanese", and "Other". Due to the insufficient sample sizes for the nonwhite categories, it was determined that the different races could be grouped together. The hypothesis pertaining to race remains inconclusive as to its impact on retention.

TABLE 6
DEMOGRAPHIC VARIABLES

THEORETICAL VARIABLE	SURVEY QUESTION	VARIABLE DESCRIPTION
SEX	035	0=Male 1=Female
AGE	036	Continuous
RACE	039	0=White 1=Nonwhite
DEGREE	046	0=Bachelor and Other (*)
▪ MASTERS		1=Masters
▪ PHD		1=PhD

* "Bachelor" and "Other" were the default reference group for both "Masters" and "PhD" degrees.

Degree attainment is categorized into three groups: individuals with a "Masters" degree, "PhD", or the reference group which consists of "Baccalaureate" and "Other" degree. The level of a degree is likely to have a mixed impact on retention. For example, if someone has an advanced technical degree at a young age, he/she may attempt to enter the civilian labor market in order to realize greater economic potential. Alternatively, higher education may be perceived as a maturation determinant. An individual may feel compelled to remain in a stable environment, and opt not to risk the compensation and benefits received from the military.

2. Work Related Variables

An individual's status within the work environment is theorized to have some impact on turnover, as previously suggested by Kushell [Ref. 6]. Three variables were classified as work related. They include the number of PCS moves made, work experience, and the officer's occupation.

TABLE 7
WORK RELATED VARIABLES

THEORETICAL VARIABLE	SURVEY QUESTION	VARIABLE DESCRIPTION
PCS (##)	022	Continuous
EXPERIENCE	036,045	Continuous (a)
OCCUPATION	00CC1	0=Nonadmin. (b) 1=Admin. and Support

(a) A proxy variable was created for EXPERIENCE by the following equation:

$$\text{EXP} = \text{AGE}(045) - \text{EDUCATION}(036) - 5(\text{Pre-school years})$$

(b) All medical, dental, nursing, chaplain, and legal occupations were deleted from the final sample.

The number of PCS moves an individual or family encounters is likely to have some impact on retention due to their disruptive nature. If an officer has a spouse who works outside the home, that officer may base his/her retention decision on the ability of the spouse to find new employment at another base. More frequent moves are likely

to disrupt any career potential for the spouse. Remaining in the same metropolitan area would allow the spouse to gain experience and valuable job tenure. It is hypothesized that an officer may elect not to move if he/she has a spouse gaining civilian work experience; whereas, individuals who visualize the military as a full career may accept more frequent moves. The more moves a family makes the less likely they are to separate. This may possibly be due to the need for the stable income which may be difficult to secure in the private sector as the number of moves increases proportionately.

As Ehrenberg and Smith point out, work experience plays an important role in turnover behavior. As an individual gains more experience in the labor force, he/she is likely to become more stable, and remain on one career path. Since total labor force experience was not a tangible variable, a proxy variable for work experience was utilized. The number of years of education an individual attained was subtracted from his/her age, minus the first five years (pre-school) of one's life. This displays work experience more readily than a variable such as the length of military service. Total time in service for many officers includes completing education and training programs while on active duty, to include attending these institutions full time. These time periods should be attributed to educational attainment as opposed to work experience.

An officer's occupation may also have some correlative relationship to attrition behavior. Officers who are in highly technical or operational skill areas may be more likely to leave than officers who are in administration or other support fields. For example, pilots may have a higher propensity to leave the military than non-rated officers, as illustrated in Chapter I, Figure 2.

3. Family Related Variables

As many studies have revealed, the family is rapidly becoming a key determinant in turnover research (Szoc and Seboda, Solnick, Kringer, Black, Vernez and Zellman, Smith and Goon, and Payne). Consequently, several variables relating to the family are included in the theoretical model formulation.

The initial family variable for inclusion in the model is marital status, as reflected in Table 8. Keeping in line with Solnick's results [Ref. 23] and actual Air Force retention (Figure 2), it seems plausible to assume a married member may be more stable and less likely to resign.

The number of dependents is likely to have a positive impact on an officer's retention. If an officer has no dependents, he/she may be swayed less by the stability of the military, and be willing to risk quitting in order to pursue civilian alternatives. Having one or more dependents is likely to have a stabilizing effect, and contribute to an officer remaining in the military.

Associated with this stability is the family's need for continued or increased income security.

TABLE 8
FAMILY RELATED VARIABLES

THEORETICAL VARIABLE	SURVEY QUESTION	VARIABLE DESCRIPTION
MARITAL STATUS	051	0=Married 1=Unmarried
NUMBER OF DEPENDENTS	067	Continuous
AGE OF YOUNGEST CHILD AT HOME	YOUNGEST	0=None or Left Blank (Reference)
▪ PRE-SCHOOL		1=Age 0-4 Years
▪ MIDDLE CHILD		1=Age 5-12 Years
▪ TEEN AGE, AND ABOVE		1=Age 13+ Years

The age of the youngest child at home should have an effect similar to the number of dependents. Results from previous research (Solnick, Payne) revealed that households with a pre-school age child were more likely to have an unemployed spouse (wife). Consequently, an officer with a child in need of constant adult care may be less likely to resign from his/her position if the spouse is not in the labor force. It is uncertain what impact the youngest child at home has on unmarried officer retention. For example,

unmarried members may elect to leave the military if they must be separated from their child for extended periods. Alternatively, these officers may view the military as a secure environment and choose to stay for the economic stability. The sample was divided into four categories; the reference group of officers with no children, those with pre-school age children at home, older children (five to 12) who need less adult supervision, and teenagers and above (13 plus) who are fairly capable of self-reliance.

4. Economic Variables

The economic status of a household plays a very fundamental role in attrition decisions. If a family has financial stability, they maintain greater flexibility in deciding to stay with a current employer or to risk that in hopes of finding increased economic potential.

Table 9 shows the number of weeks during the past year a military spouse worked. This variable helps to establish whether the spouse is employed full-time, part-time, or performing household production. Also embodied in this discussion is whether the spouse is career-oriented or not. Theoretically, if a military couple has been at one location for an extended period, and if the spouse chooses to work, it seems reasonable to assume that the supportive income will add to the family's economic stability. A couple may not want to give up the dual-income potential.

TABLE 9
ECONOMIC VARIABLES

THEORETICAL VARIABLE	SURVEY QUESTION	VARIABLE DESCRIPTION
SPOUSE WORKED IN 1984	098	0=Less than 26 weeks 1=Worked 26 weeks or more
TOTAL FAMILY DEBT	0102	Mean value within a speci- fied range (ent)
TOTAL FAMILY INCOME IN 1984	INCOME2,VHA	Continuous (L2)

ent The total debt excluded mortgage payments on homes, and the respondent was asked to select from a range of values indicated as follows:

1 = NO DEBT	5 = \$5,000 - \$9,999
2 = \$1 - \$499	6 = \$10,000 - \$14,999
3 = \$500 - \$1,999	7 = \$15,000 +
4 = \$2,000 - \$4,999	

L2 Total family income was calculated by the following equation: $TTLINC = INCOME2 - VHA$. The resultant number included total taxable income and other entitlements equally received by all military members (Basic Allowance for Quarters, and Basic Allowance for Subsistence). VHA is not a consistent amount for all members.

Ehrenberg and Smith [Ref. 2] explain that a family may be less willing to move to a new location if the costs incurred from the lost portion of the dual-income are excessive. They point out that an individual will be more likely to quit where the overall costs are the least. Consequently, if a spouse opts for a career, the period of time worked may have a negative effect on retention. It may also have a strong relationship to the number of PCS moves a family makes.

The variable for spouse employment was dichotomized into those who worked 26 weeks or more in 1984, and the reference group of those who worked less than 26 weeks. This was an arbitrary decision suggested by Lamboni who felt spouses working more than six months during the year demonstrated a stronger desire to be employed than those who worked less.

The amount of debt a family holds should have a direct relationship to turnover behavior. The larger the debt is the more likely an officer will be to remain in the military. He/she may find secondary employment, but risking a primary source of income is unlikely.

Mean values were calculated from these debt ranges, and interpreted as continuous values for the independent variable. It may be noted that no upper bound was provided for the \$15,000 and above range; consequently, an arbitrary decision was made to establish the debt ceiling

at \$30,000. The variable for debt excluded the mortgage on homes.

Total family income should have an effect similar to debt. A higher debt to income ratio is likely to have a positive effect on retention. Conversely, high income families with little debt may be more willing and able to risk their income security by leaving the military in search of civilian employment potential.

5. Career Related Variables

From the literature reviewed, it was pointed out that affiliation with an organization and intent to quit demonstrate a strong correlation between civilian alternative employment and actual turnover behavior. Questions in the survey focused on career retention decisions of officers and their feelings toward the military.

Table 10 displays two variables relating to a member's professional career. These variables involve an officer's feelings toward his/her military career and whether the officer has been exposed to the private sector labor market in the past year.

TABLE 10
CAREER RELATED VARIABLES

THEORETICAL VARIABLE	SURVEY QUESTION	VARIABLE DESCRIPTION
LOOK FOR CIVILIAN JOB IN 1984	095	0=No / Not Answered 1=Yes
SATISFACTION WITH MILITARY LIFE	0110	0=Satisfied to very satis- fied 1=Very dis- satisfied to somewhat satisfied

An officer who has looked for civilian alternatives in the past year may have already made the decision to leave the military. The national unemployment rate may be linked to this variable. If an officer cannot find sufficient civilian opportunities he/she may be more likely to remain in the military. Conversely, if many alternatives exist, attrition is likely to increase proportionately. It is therefore hypothesized that if an officer is searching for alternative employment, this may be an indicator that the officer is planning to leave the military if a job can be found.

The variable pertaining to a member's satisfaction with his/her military lifestyle was a broad question encompassing many aspects. Respondents were asked one question which focused on their overall opinion on many

issues such as family programs, dental and health care, job security, and pay. The variable was established as follows:

- 1 = Question not answered
- 1 = Very dissatisfied
- 2 = Dissatisfied
- 3 = Somewhat dissatisfied
- 4 = Neither dissatisfied / satisfied
- 5 = Somewhat satisfied
- 6 = Satisfied
- 7 = Very satisfied

The categories were partitioned into a dichotomous variable representing officers who answered "very dissatisfied" to "somewhat satisfied" with the military way of life, and the reference group ranged from "satisfied" to "very satisfied". It seems reasonable to assume someone who is satisfied with their career will likely opt to stay in the military.

E. DEPENDENT VARIABLE

The dependent variable consists of an officer's decision to stay or leave the military, and is modeled against the explanatory variables described above. The variable is dichotomous in its structure, and measures the actual retention behavior of officers.

DMDC created a new variable to track the actual retention patterns of all the respondents. Members were classified in one of four categories:

- Remained on active duty
- Left active duty and joined the reserves
- Left active duty and did not join the reserves
- Retired from active duty

The most recent DMDC data contains information on individuals up to 30 September 1987. Of the sampled respondents extracted for this analysis, 18% had left the service since 31 March 1985, excluding officers who retired. The final estimation examines actual attrition of these individuals, and also compares that with career intentions. The expected impact of the selected explanatory variables on retention is reflected in Figure 3.

	(-)	(+)	(+)	(?)	(?)
RETENTION = f	(FEMALE,	AGE,	DEGREE,	RACE,	PCS,
	(+)			(-)	(+)
0=Leave	EXPERIENCE,	NON-ADMINISTRATIVE	JOB,	MARRIED,	
1=Stay	(+)		(+)	(-)	
	DEPENDENTS,	YOUNGEST CHILD,	SPOUSE WORKED,		
	(+)	(?)	(-)		
	TOTAL DEBT,	TOTAL INCOME,	LOOK FOR JOB,		
	(+)				
	SATISFIED WITH MILITARY)				

Figure 3, Theoretical Model With Expected Effect on Retention

Several logit models are estimated tentatively. One looks at the characteristics of the entire group of Air Force captains who stayed in or left the service, excluding members who actually retired. Other models isolate married and unmarried officers to contrast their retention characteristics. From the literature reviewed and hypotheses

suggested, it is also plausible to assume men and women display different retention patterns. Separate models compare these individuals also. Actual figures are compared with predicted.

IV. RETENTION ANALYSIS

A. FINAL MODEL AND STATISTICAL DESCRIPTION

The final models included the variables described in Table 11. Several variables were dichotomized into fewer categories than originally stated in Chapter III, as they were found to be correlated with one another. A description of these dichotomized variables follows.

1. Dichotomous Variables

Degree attainment was grouped into two categories. The reference group consisted of those with a "Bachelors" or "Other" degree, and the specified group consisted of those with a "Masters" or "PhD" degree. Post-graduate degrees are likely to have similar impacts on retention decisions.

The number of PCS moves a family makes was originally constructed as a continuous variable. It was found to be insignificantly related to retention. As these individuals displayed an average of three-and-a-half moves each, an arbitrary decision was made to partition the variable into two groups; individuals who had moved zero to three times, and those who had moved more than three times.

TABLE 11
MODELED VARIABLE DESCRIPTIONS

(Continued on next page)

VARIABLE	1	0
<hr/> Dependent Variable <hr/>		
STAY	Member remained in the Air Force	Separated (To Private Sector and/or Reserves)
<hr/> Demographic <hr/>		
FEMALE	Female	Male
AGE	Present age of member (Continuous)	
NONWHITE	Other than White	Caucasian
MA_PHD	Greater than 4 years of college	Otherwise 4 years or less college
<hr/> Work Related <hr/>		
ADMIN	Member works in administrative or support field	Other than admin. or support field (eg: technical, pilot)
PILOT	Officer has a primary AFSC as a pilot (*)	Officer holds any other primary AFSC
EXPERNCE	Proxy for experience (Continuous) (Experience = Age - Years of Education - 5)	
PCS3	Moved more than 3 times	Otherwise 0-3 moves

* Air Force Specialty Codes (AFSCs) are alphanumeric descriptive codes which represent job positions and duty titles. These codes were extracted directly from individual personnel data; they were not self-reported from the survey.

TABLE 11
MODELED VARIABLE DESCRIPTIONS
(Concluded)

VARIABLE	1	0
<hr/> Family Related <hr/>		
MARRIED	Member is unmarried (single, widowed, divorced, separated)	Member is married at present time
DEPDNT	Member has one or more dependents	Member zero dependents (spouse excluded)
<hr/> Economic <hr/>		
SPWORKD **	Spouse worked 26 weeks or more (Used in married model only)	Spouse worked 0-25 weeks during past year
TTLDEBT	Total family debt, excluding mortgage (Continuous)	
TTLINC	Total gross family income, excluding Variable Housing Allowance (Continuous)	
<hr/> Career Related <hr/>		
LOOK4JOB	Looked for a civilian job in past year	Did not look for a job or answer question
SATLIFE	Very dissatisfied to somewhat satisfied with military life	Satisfied to very satisfied with military life

** Applies only to married officers.

As hypothesized earlier, members may be more likely to remain in the military after they have made several moves. Once a military family has made more than three PCS moves, they seem more likely to stay in the military, as they have gained tenure and may not want to give up the time invested. Individuals may be likely to make career decisions at an early stage, while moving only a couple times before deciding to leave the military.

The number of dependents was partitioned into those with one or more children and the reference group of those with no children. It is assumed that officers with no dependents are not as constrained to stay in the military, and those with several may display stronger retention behavior. The age of the youngest child at home contributed little explanation to retention behavior, and was found to be highly correlated with the number of dependents in a household. Consequently, only the number of dependents in the family was included in the final estimation.

2. Descriptive Statistics

Table 12 displays the means and ranges of values associated with the continuous variables. For example, the average Air Force captain with four to 11 years of service is about 31 years old and has about 9 years of work experience. The typical officer has also moved an average of at least three times during his/her career, holds about \$7000 debt, and earns about \$37,000 a year. Spouses of

married members have worked some 11 weeks during the past year, and the typical family includes one dependent besides the spouse.

TABLE 12
DESCRIPTIVE STATISTICS FOR CONTINUOUS VARIABLES

VARIABLE	MEAN VALUE	RANGE	
		MIN	MAX
AGE	30.91	23	40
EXPERNCE	8.73	1	20
PCS	3.41	0	10
DEPDNT	1.04	0	7
SPWORK (**)	10.59	0	52
TTLDEBT	7121.58	0	22500
TTLINC	37403.13	15511	114219

** Mean value was calculated for married officers only.

Table 13 illustrates the percentages associated with the categorical variables included in the final estimations. The figures displayed in the right column are representative of the reference group, while the left side captures the specified group. The reference group generally represents the typical group of people from which to make comparisons. For example, the majority of captains with four to 11 years of service are men, while women embody the minority. The only case where the majority was not used was for dependents. The reference group included those individuals with no dependents, while the group to be compared included officers with one or more dependents.

TABLE 13

DESCRIPTIVE STATISTICS FOR CATEGORICAL VARIABLES

VARIABLE	% OF SAMPLE	REFERENCE GROUP	% OF SAMPLE
FEMALE	33.1 %	MALE	66.9 %
NONWHITE	13.1 %	WHITE	86.9 %
MA_PHD	41.2 %	BACHELOR	58.8 %
PILOT	9.4 %	NOT A PILOT	90.6 %
PCS = 4-10	42.2 %	PCS = 0-3	57.8 %
ADMIN. SUPRT.	31.3 %	NONADMIN.	68.7 %
UNMARRIED	25.9 %	MARRIED	74.1 %
DEPDNT = 1-8	54.7 %	DEPDNT = 0	45.3 %
SPWORKD	20.2 %	DID NOT WORK	79.8 %
LOOK4JOB	10.6 %	DID NOT LOOK	89.4 %
NOT SATISFIED	44.1 %	SATISFIED	55.9 %

B. INTERPRETING LOGIT RESULTS

The logit results displayed in Tables 14 through 19 may be interpreted in the following manner. The first column of each table addresses the coefficient estimate associated with each explanatory variable. The second column displays the significance level of each estimated coefficient. For example, in looking at the variable for gender on Table 14, the coefficient estimate is $-.647$, and the coefficient is significant at the .004 level.

The third column requires a more detailed explanation in order to interpret the displayed results. Initially, a base case was developed to provide a reference group with which to compare the changes in the probabilities resulting from attributes being altered.

TABLE 14
LOGIT REGRESSION OF ALL OFFICERS
(Total Observations = 1089)

EXPLANATORY VARIABLE	COEFFICIENT ESTIMATE	SIGNIFI- CANCE LEVEL	CHANGE IN (a) REFERENCE PROBABILITY
FEMALE (-)	-0.647	0.004	-0.065
AGE	0.322	0.004	0.084 (b)
NONWHITE (?)	0.005	0.985	0.001
MA_PHD (?)	-0.284	0.256	-0.025
EXPERNCE	-0.237	0.027	-0.396 (b)
PCS3	0.431	0.026	0.028
ADMIN	0.165	0.409	0.012
PILOT (-)	-0.346	0.248	-0.031
MARRIED	0.287	0.285	0.019
DEPDNT	-0.048	0.828	-0.004
TTLDEBT	0.015	0.230	0.008 (c)
TTLINC (-)	-0.018	0.013	-0.077 (c)
LOOK4JOB (-)	-1.518	0.0001	-0.211
SATLIFE (-)	-0.951	0.0001	-0.108

(a) Base case probability = .918

(b) The change in the base case probability was calculated by adding one year to the mean value.

(c) The change in the base case probability was calculated by adding 10 percent to the mean value.

(?) Mixed/undetermined impact on retention.

(-) Hypothesized impact on retention.

The base case is derived from the estimated logit equation using the reference groups of categorical variables defined in Table 11 and the mean values of the continuous variables. An example of an estimating equation for a base case is provided using the modeled results from Table 14, illustrated as follows:

$$\begin{aligned}
 Z = & -4.9 - .65(\text{FEMALE}=0) + .32(\text{AGE}=30.9) + .01(\text{NONWHITE}=0) \\
 & - .28(\text{MA_PHD}=0) - .24(\text{EXPERNCE}=8.7) + .43(\text{PCS3}=0) \\
 & + .17(\text{ADMIN}=0) - .35(\text{PILOT}=0) + .29(\text{MARRIED}=0) \\
 & - .05(\text{DEPDNT}=0) + .015(\text{TTLDEBT}=7.12) \\
 & - .018(\text{TTLINC}=37.40) - 1.5(\text{LOOK4JOB}=0) \\
 & - .95(\text{SATLIFE}=0)
 \end{aligned}$$

$$Z = 2.39$$

This model represents the reference group with which to make comparisons as to the impact of individual explanatory variables on retention, holding all other variables constant. The value calculated for Z (2.39) was substituted into the probability equation described below, thus establishing a base case probability of .918 for the model of all officers.

$$P_1 = \frac{1}{1 + e^{-Z}}, \text{ where } Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n$$

$$P_1 = .918$$

Dichotomous variables were subsequently selected on an individual basis, in order for Z and P_1 to be recalculated. The change in the base case P_1 was then calculated and displayed in the last column of Table 14. As an example, the variable for gender was originally calculated for the reference group, male. It was then altered to reflect female officers (FEMALE=1). Z and P_1 were then recalculated. The difference between the two probabilities is displayed in the third column of Table 14. Women displayed a 6.5% lower likelihood of staying in the Air Force than men, holding all other variables constant. For the continuous variables "age" and "experience", the base case was compared with adding one year to the mean values. For "total debt" and "total income", 10% was added to the applicable mean values to be compared with the base case.

C. ESTIMATION ADDRESSING ALL CAPTAINS

The principal logit model estimated the retention behavior of all captains within the sampled population. Table 14 illustrates the results from the model.

1. Demographic Variables

As reflected in Table 14, basic biographical characteristics were found to have a statistically significant impact on retention behavior. This confirms past analyses suggesting that these variables are fundamental to econometric models addressing retention behavior. Of these

determinants, gender and age were found to have statistically significant effects on retention, as hypothesized in Chapter III.

Men displayed higher retention behavior than women, as expected. The gender variable was found to be highly significant at less than the 1% level. Women were 6.5% more likely to leave the military than men, as compared to the base case previously discussed. This supports the theory that women are more likely to enter and exit the labor force more frequently than men to achieve such personal goals as to raise families.

Age was also highly significant at less than the 1% level. As hypothesized, the older an individual was, the more likely he/she was to remain in the military. Officers who were one year above the mean age were 8.4% more likely to stay, as compared to the base case scenario.

The variable for race was not found to be statistically significant. The reference group of "whites" displayed lower retention behavior than the specified group of "nonwhites".

If an officer held an advanced degree, he/she was less likely to remain in the service. This might suggest that individuals who obtain advanced degrees may be confident of finding greater economic opportunities elsewhere. This variable was not found to be statistically significant.

2. Work Related Variables

Work experience was statistically capable of explaining retention behavior, significant at the 2.7% level. An officer with one year more experience than the mean number of years had a 39.6% lower likelihood of staying in the military, as compared to the base case. The variable was not originally hypothesized to have a negative impact, yet it is explainable. As these officers gain more marketable experience, they must make a determination either to fulfill a military career or begin a civilian alternative. These captains being considered for promotion to major have accumulated some eight to 11 years of job experience. As noted in Table 12, the average work experience gained by these officers is about nine years, the point in time when individuals are concerned about their promotion potential. Since they understand that the next level of promotion vacancies to the paygrade of major are limited, they may leave prematurely if they feel they are not competitively promotable. They are likely to opt for alternative career paths, such as attempting to enter the private sector labor force, in order to maintain their marketable work experience.

The number of PCS moves a member and/or a family makes was significantly related to retention behavior at the 2.6% level. Officers who had made three or fewer moves were more likely to separate than officers making more than three

moves. As hypothesized, career intention may be related to the number of PCS moves a member encounters. As discussed, officers with spouses opting for work may have decided to separate due to these occasional employment disruptions. Individuals who had made more than three moves were 2.8% more likely to stay in the military than those representing the base case of making three or fewer moves. This further supports the theory that officers who have accepted the military as a way of life may have also accepted occasional reassignments as part of that lifestyle. It may again be noted that the number of PCS moves an officer makes is a suitable proxy for tenure.

The two variables which looked at occupational fields were not found to be statistically significant, yet they reflected the expected impact on retention. The first variable dichotomized officers into administration and support occupations, with non-administrative officers representing the reference group. The results showed that administration and support officers were 1.2% more likely to stay in the military as compared to more operational officers, holding all other variables constant in the base case. The second occupation variable dichotomized officers into a group of pilots and the reference group of all other officers. Pilots displayed higher attrition behavior than all other officers as expected, while the variable was not found to be statistically significant. Pilots were 3.1%

more likely to leave the military than all other officers, holding other variables constant in the base case.

3. Family Related Variables

Marital status was found to be positively related to retention, while not statistically significant. This supports the AFMPC data reflected in Figure 2. Married officers appear to be more likely to value the economic stability that the Air Force provides.

The number of dependents displayed unusual behavior, yet the variable was not found to be statistically significant. If an officer had no dependents, he/she was more likely to stay in the military than an officer with one or more dependents (besides the spouse). Later discussions which contrast married and unmarried officers do, however, reveal expected correlative effects on retention.

4. Economic Variables

The total debt a military household maintained was not found to be statistically significant. As hypothesized however, a larger debt contributed to positive retention behavior.

Total family income was found to be statistically significant at less than the 2% level. Family income was hypothesized to have a negative impact on retention. The greater the financial stability, the more capable a family may be of risking future income on civilian alternatives. As displayed in Table 14, a 10% increase in income resulted

in a 7.7% greater probability that the officer will leave the military, as compared to the base case of individuals earning the mean income.

5. Career Related Variables

The career related variables displayed highly significant relationships to retention, significant at less than the 1% level. Each variable showed the hypothesized relationship to retention. It must be noted that these variables may not directly affect retention, but may be merely precursors to attrition behavior. These variables may be intervening indicators of attrition behavior. As discussed in the literature review, and Chapter III, individuals who display a dislike for their job or those who have looked for a new job in the recent past, may have already made a decision to leave their current employer.

Officers who had looked for civilian jobs in the past year were more likely to leave the military than members who had not looked for civilian alternatives. This variable was significant at less than the 1% level. An individual who looked for a job in the past year was 21.1% more likely to leave the military than all other officers, as compared to the base case of those did not look for a job.

Members who were "satisfied" to "very satisfied" with the military way of life were also more likely to stay in the military than someone who was "very dissatisfied" to

"somewhat satisfied". This variable was also statistically significant at less than the 1% level. An individual who was "very dissatisfied" to "somewhat satisfied" with the military way of life was 10.8% less likely to stay in the military, as compared to the base case of those who were "satisfied" to "very satisfied".

D. ESTIMATIONS CONTRASTING MARRIED AND UNMARRIED OFFICERS

Alternative logit models estimated the retention behavior of married and unmarried members within the sampled population. Table 15 illustrates the results from the model for all married officers, while Table 16 displays the results for unmarried officers.

Differences existed between these groups of officers, as well as contrasts in the sizes of the coefficient estimates for the model of all officers. Coefficient estimates and statistical significance levels of variables in the model for married officers were relatively similar to the model of all officers, while the model for unmarried officers resulted in fewer variables having significant explanatory power. These results are highlighted in the discussions of individual explanatory variables. The variable addressing whether the spouse was employed during the past year was included in the estimation for married officers only.

TABLE 15

LOGIT REGRESSION OF MARRIED OFFICERS

(Total Observations = 821)

EXPLANATORY VARIABLE	COEFFICIENT ESTIMATE	SIGNIFI- CANCE LEVEL	CHANGE IN (a) REFERENCE PROBABILITY
FEMALE (-)	-1.109	0.0003	-0.106
AGE	0.331	0.011	0.063 (b)
NONWHITE (?)	-0.019	0.953	-0.001
MA_PHD (?)	-0.159	0.587	-0.010
EXPERNCE	-0.205	0.096	-0.278 (b)
PCS3	0.573	0.014	0.026
ADMIN	0.302	0.216	0.016
DEPDNT	-0.161	0.509	-0.010
SPWORKD (-)	-0.168	0.506	-0.011
TTLDEBT	0.026	0.074	0.012 (c)
TTLINC (-)	-0.008	0.429	-0.024 (c)
LOOK4JOB (-)	-1.776	0.0001	-0.221
SATLIFE (-)	-0.938	0.0001	-0.083

(a) Base case probability = .937

(b) The change in the base case probability was calculated by adding one year to the mean value.

(c) The change in the base case probability was calculated by adding 10 percent to the mean value.

(?) Mixed/undetermined impact on retention.

(-) Hypothesized impact on retention.

TABLE 16
LOGIT REGRESSION OF UNMARRIED OFFICERS

(Total Observations = 268)

EXPLANATORY VARIABLE	COEFFICIENT ESTIMATE	SIGNIFI- CANCE LEVEL	CHANGE IN (*) REFERENCE PROBABILITY
FEMALE	0.206	0.551	0.016
AGE	0.376	0.119	0.094 (b)
NONWHITE (?)	-0.085	0.856	-0.008
MA_PHD (?)	-0.658	0.224	-0.073
EXPERNCE	-0.395	0.092	-0.694 (b)
PCS3	0.082	0.835	0.007
ADMIN	0.156	0.667	0.013
DEPDNT	0.020	0.974	0.017
TTLDEBT	-0.019	0.498	-0.009 (c)
TTLINC (-)	-0.028	0.061	-0.109 (c)
LOOK4JOB (-)	-1.038	0.029	-0.132
SATLIFE (-)	-1.280	0.0002	-0.177

(*) Base case probability = .906

(b) The change in the base case probability was calculated by adding one year to the mean value.

(c) The change in the base case probability was calculated by adding 10 percent to the mean value.

(?) Mixed/undetermined impact on retention.

(-) Hypothesized impact on retention.

1. Demographic Variables

In the estimation for married members only, female officers were found to display higher attrition behavior than men. The variable was statistically significant at less than the 1% level. Married women displayed a 10.6% greater chance of leaving the military, as compared to married men. This supports the notion that married women are more likely to enter and leave the labor force to raise families; whereas, men are less likely to give up the income security provided by the Air Force. Single women were found to be more likely to stay in the military than single men, but the coefficient for this variable was not statistically significant. In comparing the coefficient estimates from the model for all officers on Table 14 with the models contrasting married and unmarried members, the results show that gender had a greater impact on retention for married members than for the other two groups examined.

Age was found to be significant for both groups of officers, with a significance level of 1.1% for married officers and 11.9% for unmarried officers. The older an individual was the more likely he/she was to stay in the military, as hypothesized. If a married officer was one year older than the mean age, he/she displayed a 6.3% greater probability of staying in the military. For unmarried officers, the change in probability was 9.4%, as compared to the base case.

Race and degree attainment were not found to be significant in either model; however, they both affected retention behavior in an explainable manner, as addressed earlier in the discussion on all officers. "Nonwhite" members were more likely to leave the military than the reference group of "white" officers. Officers with advanced degrees were found to have higher attrition behavior than individuals with bachelors degrees. As stated earlier, individuals who had obtained advanced degrees may be more confident of finding greater economic opportunities in the civilian labor market.

2. Work Related Variables

Work experience was found to be statistically significant at the 9.6% level in the model of married members, and the 9.2% level for unmarried members. It had an effect similar to that of all officers; the more experience an individual gained the more likely he/she was to leave the military. As stated earlier, this result was not expected to have a negative effect on retention. However, as suggested, these officers are at a critical decision point in their careers. This group of captains typically had approximately nine years of experience, the point in time when these individuals are concerned about their promotion opportunities. Since they understand that the next level of promotion vacancies to the paygrade of major are limited, they may leave prematurely if they feel they are not

competitively promotable. They are likely to opt for alternative career opportunities, such as entering the civilian labor market.

As married officers gained one more year of experience above the mean number of years, they were 27.8% less likely to stay in the military, as compared to the base case. Unmarried officers were 69.4% less likely to stay, as compared to those who attained the mean number of years experience.

If a military family had made three or fewer PCS moves, they were found to be less likely to stay in the Air Force than families who had moved more than three times. The variable was significant for married members only, at the 1.4% level. This again supports the hypothesis of married officers making a determination to separate from the military before making several relocations. This could be attributed to officers with either working spouses or those with children in school. They may wish to forgo the occasional social and/or economic disruptions associated with these relocations. Members who have accepted the Air Force as a way of life may have also accepted these occasional reassignments as part of the lifestyle.

The type of occupation was found to be insignificant in both models. However, administrative or support positions did have a positive effect on retention, as expected. This supports the hypothesis that more technical

or operational officers are more likely to leave the military than administrative or support officers. The demand for these skills and the economic potential in the private sector are likely to be higher than for administrative occupations.

3. Family Related Variables

The number of dependents was not found to be statistically significant in either model. Unexpected behavior was identified in the model addressing married members. A household consisting of a couple with no dependents was found to have a positive effect on retention as opposed to having one or more dependents. It may be possible that an officer with one or more dependents may not wish to uproot the entire family every few years. For instance a household may include teen-age dependents who are possibly reluctant to leave the area and their friends. This may be influential to some degree. Single officers reacted as expected. Those with no dependents were found to be more likely to separate.

4. Economic Variables

For the married members, the variable pertaining to the spouse being employed during the past year was found to be insignificant. It did have the expected impact on retention behavior. If an officer had a spouse who worked 26 weeks or more during the year, he/she was more likely to

separate than someone with a spouse who worked less than 26 weeks.

Total family debt was also found to be statistically significant at the 7.4% level for married officers only, while contributing to retention behavior as hypothesized. Higher debt was associated with higher retention for married members, while higher debt negatively impacted retention of unmarried members. This could be associated with unmarried officers displaying a willingness to risk present income for potential gains from the private sector. As they accumulate more debt, they may have a perceived need for greater economic potential to offset the incurred obligations.

Total family income was found to be statistically capable of explaining attrition behavior for unmarried officers only, significant at the 6.1% level. The more money either group of officers earned the more likely they were to leave the Air Force. Married officers who earned 10% above the mean income displayed a 2.4% lower likelihood of staying in the Air Force, as compared to the base case of those who earned the mean income. Unmarried members displayed a 10.9% greater probability of leaving the military, as compared to the base case. This again supports the theory that financial stability allows a military family greater flexibility in deciding to risk future income on civilian alternatives.

5. Career Related Variables

The variable addressing whether an officer had looked for a job in the past year resulted in expected correlative behavior for both groups. It was statistically significant for both groups of officers, at less than the 1% and 2.9% levels, respectively. Married members were 22.1% less likely to stay in the military, as compared to the base case of individuals who had not looked for a job in the past year. Unmarried members were 13.2% less likely to stay in the military. As previously stated, these individuals who have looked for a job in the recent past may have already made their decision to leave the military. This may only be a signal as to their intent to separate.

If either group of officers were satisfied with their careers, they were found to be more likely to stay in the Air Force, as compared to those individuals who had claimed to be "very dissatisfied" to "somewhat satisfied". The variable was statistically significant at less than the 1% level for both models. Married and unmarried members, respectively, displayed a 8.3% and 17.7% more likelihood of leaving the Air Force, as compared to the base case. The coefficient estimate showed that unmarried members were more influenced by their satisfaction with the military than married members or the entire group of officers. The variable had a greater impact on their decision to leave the Air Force.

E. ESTIMATIONS CONTRASTING MEN AND WOMEN

A "chow test" was performed to determine if sufficient differences existed between men and women which would permit estimating these groups separately. The results indicated that the estimated coefficients from the two equations were significantly different from one another. Consequently, alternative models were included. Table 17 displays the logistic estimates for the men, while Table 18 addresses the results for the women. Except for marital status, the estimation for women contained the same statistically significant variables as the model for men, as well as five additional significant variables. These contrasting results in explanatory power may be associated with the differences by gender.

1. Demographic Variables

For women, age was found to be statistically significant at less than the 1% level in explaining retention behavior. In addressing the base case, if women were one year older than the mean age, they displayed a 14.7% greater likelihood of staying in the Air Force. For men, the change in probability was 10.4%. The variable had the expected effect on retention for both groups. Older officers were more likely to stay in the military.

TABLE 17
LOGIT REGRESSION OF MEN
(Total Observations = 726)

EXPLANATORY VARIABLE	COEFFICIENT ESTIMATE	SIGNIFI- CANCE LEVEL	CHANGE IN (*) REFERENCE PROBABILITY
AGE	0.224	0.131	0.104 (b)
NONWHITE (?)	-0.357	0.360	-0.038
MA_PHD (?)	-0.099	0.767	-0.009
EXPERNCE	-0.185	0.194	-0.319 (b)
PCS3	0.339	0.175	0.027
ADMIN	0.279	0.349	0.023
MARRIED	0.782	0.037	0.053
DEPDNT	0.039	0.899	0.004
TTLDEBT	-0.0001	0.991	-0.001 (c)
TTLINC (-)	-0.011	0.362	-0.046 (c)
LOOK4JOB (-)	-1.505	0.0001	-0.239
SATLIFE (-)	-1.307	0.0001	-0.195

(*) Base case probability = .896

(b) The change in the base case probability was calculated by adding one year to the mean value.

(c) The change in the base case probability was calculated by adding 10 percent to the mean value.

(?) Mixed/undetermined impact on retention.

(-) Hypothesized impact on retention.

TABLE 18
LOGIT REGRESSION OF WOMEN
(Total Observations = 363)

EXPLANATORY VARIABLE	COEFFICIENT ESTIMATE	SIGNIFI- CANCE LEVEL	CHANGE IN (d th) REFERENCE PROBABILITY
AGE	0.472	0.007	0.147 (b)
NONWHITE (?)	0.365	0.328	0.040
MA_PHD (?)	-0.656	0.098	-0.102
EXPERNCE	-0.368	0.028	-0.693 (b)
PCS3	0.544	0.091	0.055
ADMIN	0.223	0.418	0.026
MARRIED (-)	-0.156	0.696	-0.021
DEPDNT (-)	-0.246	0.453	-0.034
TTLDEBT	0.039	0.040	0.035 (c)
TTLINC (-)	-0.015	0.170	-0.108 (c)
LOOK4JOB (-)	-1.675	0.0004	-0.332
SATLIFE (-)	-0.637	0.022	-0.099

(a) Base case probability = .853

(b) The change in the base case probability was calculated by adding one year to the mean value.

(c) The change in the base case probability was calculated by adding 10 percent to the mean value.

(?) Mixed/undetermined impact on retention.

(-) Hypothesized impact on retention.

The coefficient of the variable for race was found to have opposite signs for the two models, and indicated that "nonwhite" females were more likely to stay in the military, while "nonwhite" males were more likely to leave, as compared to the reference group of "whites".

Advanced degree attainment was also found to be statistically significant for women only, at the 9.8% level. The variable had the same impact on retention for both genders. Officers with advanced degrees were more likely to leave the Air Force. Women with advanced degrees were 10.2% more likely to separate from the military, as compared to the base case scenario of those with baccalaureate degrees. As suggested, individuals who had obtained advanced degrees may be confident of finding greater economic opportunities in the private sector.

2. Work Related Variables

Work experience was found to be statistically capable of explaining retention behavior for women only, significant at the 2.8% level. As women gained one more year of experience as compared to individuals attaining the mean number of years experience, they were 69.3% less likely to stay in the military.

The number of PCS moves a woman made was found to be significant at the 9.1% level. Women making more than three moves during their tenure were 5.5% more likely to stay in the military than women who had made three or fewer

moves, holding all other variables constant in the base case. The variable had a similar affect on males, yet it was not found to be statistically significant. As suggested earlier, members with spouses opting for work may have decided to separate due to these occasional employment disruptions. Officers who have accepted the Air Force as a career may have also accepted these disturbances as part of that life. It may also be noted that the number of PCS moves a member makes is a proxy for tenure.

The coefficient of the variable for occupation was not significant for men or women, yet it displayed the hypothesized relationships for both models. Officers in "administrative" positions were more likely to stay in the military than individuals in other "non-administrative" fields. As hypothesized, more operational occupations are likely to be in greater demand in the private sector market, as compared to administrative or support jobs.

3. Family Related Variables

Marital status was statistically significant in the model for men only (significant at the 3.7% level). The two models also displayed the expected impact on retention. Married men were 5.3% more likely to stay in the Air Force than unmarried officers, as compared to the base case. As hypothesized, married men were more likely to maintain the economic stability that the Air Force provides them. Alternatively, married women were less likely to stay in the

military than unmarried women, yet the variable was not found to be significant. This is further supported by the theory that married women are more likely to leave the labor market for personal reasons such as to raise families.

The variable addressing whether a member had dependents or not was found to impact retention behavior differently for women than it did for men. Women were likely to stay in the service if they had no children, while men were more likely to leave if they had none. This seems plausible as past literature and the previous discussion on marital status suggested. Women with dependents may be more likely to leave the labor force to raise families. The variable was not statistically significant in either model.

4. Economic Variables

Total family debt was found to have opposite effects for women and men. Women behaved as expected, while men displayed higher attrition as their debt increased. The variable was found to be significant for women only (at the 4.0% level). If the amount of debt held by women were increased by 10%, then they were 3.5% more likely to stay in the military than individuals in the base case.

Total income was not statistically significant for either group, yet the variable had the expected impact on retention behavior. Higher income for either group was associated with higher attrition. For example, women earning 10% more income than the mean amount were 10.8% less

likely to stay in the military than the base case scenario. Once again, greater financial stability may reflect a family's capability of risking future income on civilian alternatives. An officer maintaining substantial earnings and a proportionately small amount of debt may be more likely to invest or save for the future. This additional savings provides a certain amount of flexibility for circumstances such as breaks in employment to raise a family or to pursue continuing educational goals.

5. Career Related Variables

For both groups, career related explanatory variables were found to be highly significant, and had the expected correlative relationships to retention. Men and women who had looked for a job in the past year were 23.9% and 33.2% less likely to stay in the military than officers who had not looked for a job. Men and women were also 19.5% and 9.9% more likely to leave the Air Force if they were "very dissatisfied" to "somewhat satisfied" with the military way of life, as compared to the base case scenario.

F. RESERVE AFFILIATION VERSUS SEPARATION

An additional model described in Table 19 examined the military affiliation behavior of officers who have actually left the Air Force since 31 March 1985.

TABLE 19
LOGIT REGRESSION OF RESERVE AFFILIATION

(Total Observations = 186)

EXPLANATORY VARIABLE	COEFFICIENT ESTIMATE	SIGNIFI- CANCE LEVEL	CHANGE IN (a) REFERENCE PROBABILITY
FEMALE (?)	0.986	0.031	0.215
AGE (-)	-0.186	0.440	-0.550 (b)
NONWHITE (?)	0.930	0.148	0.204
MA_PHD (?)	0.554	0.299	0.129
EXPERNCE	0.085	0.711	0.178 (b)
PCS3 (-)	-0.081	0.845	-0.019
ADMIN (?)	-0.696	0.095	-0.172
MARRIED (?)	-0.047	0.929	-0.012
DEPDNT	0.519	0.243	0.122
TTLDEBT	-0.033	0.154	-0.062 (c)
TTLINC (-)	-0.028	0.077	-0.280 (c)
LOOK4JOB (-)	0.378	0.389	0.091
SATLIFE (-)	-0.133	0.745	-0.032

(a) Base case probability = .554

(b) The change in the base case probability was calculated by adding one year to the mean value.

(c) The change in the base case probability was calculated by adding 10 percent to the mean value.

(?) Mixed/undetermined impact on retention.

(-) Hypothesized impact on retention.

The dependent variable was dichotomized into those officers who had since joined the Reserve forces and individuals who left the service completely. From the total group of 186 individuals who either separated or joined the reserves, 49 were found to disassociate themselves from any continued affiliation. The sample size was statistically sufficient to perform a logistic regression.

The final model resulted in several variables being statistically significant; gender was one of these. Women were more likely than men to join the reserves upon separation. This variable was significant at the 3.1% level. Women were 21.5% more likely to join the reserves, as compared to the base case.

If an officer was "nonwhite", he/she was found to be more likely to join the reserves than the reference group of "white" officers. The variable was found to be statistically significant at the 14.8% level. As compared to the base case, nonwhites were 20.4% more likely to join the reserves than whites.

The type of occupation an officer held was also found to be significantly related to retention. If an individual was in an administrative or support position, he/she was 17.2% less likely to join the reserves than an officer in a more operational field. This variable was statistically capable of explaining reserve affiliation versus total disassociation from the military, at the 9.5% level of

significance. This result may be understandable since many officer positions needed today in the reserve forces are more operations oriented, such as flight-crew positions.

Members who left the service with higher total family debt were found to be less likely to join the reserves. The variable was significant at the 15.4% level. This is understandable as officers who have amassed larger amounts of debt may be likely to search for substantial employment to offset this debt; whereas, joining the reserves is similar to undertaking secondary employment. The income potential from joining may not be enough to offset the debt adequately. Members who held 10% more debt than the mean amount were found to be 6.2% more likely to leave the military than the base case group.

Also, officers who earned more income were not as likely to join the reserves. The variable was found to be significant at the 7.7% level. Officers who earned 10% more income than the base case were 28.0% less likely to join the reserves. As suggested by the debt hypothesis, individuals earning larger sums may be less likely to take a part-time position.

It is interesting to note that the two career variables, whether a member looked for a job in the past year and his/her satisfaction with military life, were not found to be statistically significant. These variables held considerable explanatory power in the models addressing

retention and attrition behavior. This indicates that using these career related variables to predict reserve intention may provide little insight to actual affiliation behavior. As noted earlier, approximately 140 of the 186 respondents from this analysis who had left the military since 31 March 1985, had joined the reserves. There may be few recognizable differences between individuals who joined the reserves and those who did not. To make the issue even more difficult to model effectively, the possibility remains that a few of the individuals who did not join the reserves in the past three years may still join at some time in the future.

G. CORRELATION OF MODELED VARIABLES

Multicollinearity is an additional consideration to be made when estimating regression equations. The main concern is to determine the severity of the multicollinearity. Severe multicollinearity makes it difficult to distinguish between the individual impacts of explanatory variables on the dependent variable. One remedy for multicollinearity is to drop one of the variables from the equation, however, this may result in the model having omitted variable bias if both variables theoretically belong in the model.

Table 20 looks at the individual variables and their correlation to one another other as a measure of determining if multicollinearity is an issue. Correlations of less than

.20 are not presented. For example, number of dependents and age were positively correlated (.25).

TABLE 20
CORRELATED VARIABLES FOR
MODEL OF ALL OFFICERS

	FEM	AGE	ADMN	EXP	DPNT	INC	LOOK
STAY	■	■	■	■	■	■	-.25
FEM	■	■	.25	■	-.32	.31	■
AGE	■	■	■	.82	.25	■	■
PCS3	■	.32	■	.31	■	■	■
MAR	-.26	■	■	■	.51	.35	■
DPNT	-.32	.25	■	.24	■	■	■
SAT	■	■	■	■	■	■	.21

NOTE: Minimum criterion for inclusion was .20 correlation with other explanatory variables.

The high correlation between age and work experience was expected since experience was a proxy created by an equation which subtracted the number of years of education from age. As stated in earlier discussions, age and experience remain fundamental concerns in modeling econometric retention data. Excluding either variable is likely to result in omitted variable bias, which is a violation of the Gauss-Markov Theorem of "best linear unbiased estimators". As Studenmund and Cassidy note, one of the consequences of

multicollinearity is lower t-scores for the estimated coefficients. As both variables displayed statistically significant results throughout the analysis, this was not a concern. Consequently, no corrective measures were undertaken. [Ref. 8]

Another variable of interest displayed on Table 20 is marital status. It is no surprise that married members and having dependents (besides the spouse) are positively correlated (.51) with each other. No action was taken to correct for multicollinearity in this case. The remaining variables may be interpreted in a similar manner. Correlations for married and unmarried members are displayed in Tables 21 and 22.

TABLE 21
CORRELATED VARIABLES FOR
MODEL OF MARRIED OFFICERS

	FEM	AGE	ADMN	EXP	INC	LOOK
STAY	▪	▪	▪	▪	▪	-.25
FEM	▪	▪	.27	▪	.56	▪
AGE	▪	▪	▪	.82	▪	▪
PCS3	▪	.29	▪	.28	▪	▪
DPNT	-.27	.22	▪	.22	-.28	▪
SPWK	▪	▪	▪	▪	.23	▪

NOTE: Minimum criterion for inclusion was .20 correlation with other explanatory variables.

TABLE 22
CORRELATED VARIABLES FOR
MODEL OF UNMARRIED OFFICERS

	AGE	PILT	ADMN	EXP	INC	LOOK	SAT
STAY	▪	▪	▪	▪	▪	-.26	-.28
FEM	▪	-.25	.20	▪	▪	▪	▪
AGE	▪	▪	▪	.82	▪	.23	▪
EXP	.82	▪	▪	▪	▪	.22	▪
PCS3	.38	▪	▪	.39	.21	▪	▪
DPNT	.24	▪	▪	.23	▪	▪	▪
LOOK	.23	▪	▪	.22	▪	▪	.27

NOTE: Minimum criterion for inclusion was .20 correlation with other explanatory variables.

Tables 23 and 24 illustrate the correlation coefficients for men and women, and those for the model of Reserve affiliation are shown on Table 25. The patterns of correlation for these models are similar to those for the model of all officers.

TABLE 23
CORRELATED VARIABLES FOR
MODEL OF MALE OFFICERS

	AGE	EXP	LOOK	SAT
STAY	▪	▪	-.29	-.25
EXP	.82	▪	▪	▪
PCS3	.30	.31	▪	▪
DPNT	.30	.28	▪	▪
LOOK	▪	▪	▪	.21

TABLE 24
CORRELATED VARIABLES FOR
MODEL OF FEMALE OFFICERS

	AGE	EXP	INC	LOOK
STAY	▪	▪	▪	-.23
MPHD	.25	▪	▪	▪
EXP	.82	▪	▪	▪
PCS3	.34	.32	▪	▪
DPNT	▪	▪	.29	▪

NOTE: Minimum criterion for inclusion was .20 correlation with other explanatory variables.

TABLE 25
CORRELATED VARIABLES FOR
MODEL OF RESERVE AFFILIATION

	FEM	AGE	PCS3	DPNT	INC	SAT
AGE	▪	▪	.41	▪	▪	▪
ADMN	.25	▪	▪	▪	▪	▪
PILT	-.20	▪	▪	▪	▪	▪
EXP	▪	.82	.41	▪	▪	▪
MAR	▪	▪	▪	.20	.36	▪
DPNT	-.21	▪	▪	▪	▪	▪
DEBT	-.21	▪	▪	.20	▪	▪
INC	.36	▪	▪	▪	▪	▪
LOOK	-.21	▪	▪	▪	▪	.29
SAT	-.26	▪	▪	▪	▪	▪

NOTE: Minimum criterion for inclusion was .20 correlation with other explanatory variables.

H. ANALYSIS OF RETENTION PREDICTIONS

The individual models were examined as to how well they predicted retention behavior of these Air Force captains with four to 11 years of service. The prediction for all officers is illustrated in Table 26. The model correctly classified some 70% of all the respondents.

TABLE 26
OBSERVED & PREDICTED
RETENTION & ATTRITION OF ALL OFFICERS

OBSERVED	PREDICTED	
	Leave	Stay
Leave (17.1%)	59.1%	40.9%
Stay (82.9%)	28.2%	71.8%

TOTAL OBS = 1089

Model Chi-Square = 128.8, with 13 degrees of freedom.

The model correctly classified 69.6% of all the respondents.

To explain the classification percentages displayed in Tables 26 through 31, the upper left and lower right corner numbers of each table represent key model predictions. For instance, in Table 26, some 60% (top left) of the 1089 officers who were predicted to leave the military actually did so, while 71.8% (bottom right) of all officers predicted to stay actually remained. As noted in the table, 82.9% of the sample actually stayed, while 17.1% actually left the service. In addressing the opposing corners of Table 26, 28.2% of the officers who were predicted to leave actually stayed, while some 41% predicted to stay actually left the

Air Force. Overall, the specified regression was capable of classifying 69.6% of the surveyed officers.

Model predictions which contrasted married and unmarried members are displayed in Tables 27 and 28, respectively. Some 69% of the 821 married members predicted to leave were correctly classified, while some 73% of the people expected to stay in the military were correctly classified. The total predictions compared to actual observations resulted in 71.9% correctly classified married members, and 66.0% of the unmarried members.

TABLE 27

OBSERVED & PREDICTED

RETENTION & ATTRITION OF MARRIED OFFICERS

OBSERVED	PREDICTED	
	Leave	Stay
Leave (15.9%)	68.7%	31.3%
Stay (84.1%)	27.5%	72.5%

TOTAL OBS = 821

Model Chi-Square = 112.6, with 13 degrees of freedom.

The model correctly classified 71.9% of the married respondents.

TABLE 28
OBSERVED & PREDICTED
RETENTION & ATTRITION OF UNMARRIED OFFICERS

OBSERVED	PREDICTED	
	Leave	Stay
Leave (20.5%)	63.6%	36.4%
Stay (79.5%)	33.3%	66.7%

TOTAL OBS = 268

Model Chi-Square = 33.0, with 12 degrees of freedom.

The model correctly classified 66.0% of the unmarried respondents.

Table 29 illustrates the predictions for men, and Table 30 addresses those for women. Overall, 70% of the men were classified correctly, versus 67.5% of the women. Even though fewer women were correctly classified as a group, a greater number of variables were found to be statistically capable of explaining retention behavior than for men.

TABLE 29
OBSERVED & PREDICTED
RETENTION & ATTRITION OF MALE OFFICERS

OBSERVED	PREDICTED	
	Leave	Stay
Leave (14.2%)	68.0%	32.0%
Stay (85.8%)	29.7%	70.3%

TOTAL OBS = 726

Model Chi-Square = 88.6, with 12 degrees of freedom.

The model correctly classified 70.0% of the male respondents.

TABLE 30
OBSERVED & PREDICTED
RETENTION & ATTRITION OF FEMALE OFFICERS

OBSERVED	PREDICTED	
	Leave	Stay
Leave (22.8%)	54.2%	45.8%
Stay (77.2%)	28.6%	71.4%

TOTAL OBS = 363

Model Chi-Square = 41.8, with 12 degrees of freedom.

The model correctly classified 67.5% of the female respondents.

The model for reserve affiliation was capable of correctly classifying 57.5% of these officers overall, as displayed in Table 31. Reserve affiliation versus total disassociation from the military appears to have some unexplained relationships which were not fully captured in this estimation.

TABLE 31
OBSERVED & PREDICTED
RESERVE AFFILIATION VERSUS SEPARATION

OBSERVED	PREDICTED	
	Separate	Reserves
Separate (26.3%)	71.4%	28.6%
Reserves (73.7%)	47.4%	52.6%

TOTAL OBS = 186

Model Chi-Square = 18.3, with 13 degrees of freedom.

The model correctly classified 57.5% of the officers who either joined the reserves or left the Air Force completely.

V. CONCLUSION

A. SUMMARY OF SIGNIFICANT RESULTS

Many factors affect an officer's decision to make a career of the military or to pursue civilian opportunities. This analysis partitioned possible influences into five categories of variables capable of explaining retention behavior. They included demographic, work related, family related, economic, and career related variables. The dependent variable was dichotomized into those officers who actually stayed or left the military. Logistic regressions were estimated for the retention and attrition behavior of captains who had four to 11 years of service, and also for married and unmarried members, and for men and women within the overall sample. The results of individual models are described in Table 32. The sample of officers used for the overall analysis consisted of approximately 1000 captains extracted from the 1985 DoD Survey of Officers and Enlisted Personnel. The models for the married and unmarried officers, and men and women are subsets of the overall sample of captains, which is the model displayed in the first column on Table 32. The alternate models are labeled accordingly.

TABLE 32
SUMMARY OF SIGNIFICANT RESULTS

VARIABLE	ALL OFFICERS	MARRIED	UN- MARRIED	MEN	WOMEN
<hr/>					
<hr/> Demographic <hr/>					
FEMALE	X	X		N/A	N/A
AGE	X	X			X
MA_PHD					X
<hr/> Work Related <hr/>					
EXPERNCE	X	X	X		X
PCS3	X	X			X
<hr/> Family Related <hr/>					
MARRIED		N/A	N/A	X	
<hr/> Economic <hr/>					
TTDEBT		X			X
TTLINC	X		X		
<hr/> Career Related <hr/>					
LOOK4JOB	X	X	X	X	X
SATLIFE	X	X	X	X	X

(X) Variable is significant at less than the 10% level.

The explanatory variables included gender, age of the officer, whether the officer had an advanced degree, the officer's work experience, whether the officer had moved an average of three or less times, marital status, total family debt, total family income, whether the officer had looked for a job in the past year, and whether the officer was satisfied with the military way of life. A majority of these explanatory variables were found to have statistically significant impacts on Air Force officer retention behavior. As noted in Table 32, the 10% level of significance was established as the overall acceptance level for the individual variables in order to summarize key results across all models. Chapter IV describes in detail the differing levels of significance which ranged from less than 1% up to 10% for the explanatory variables.

1. Demographic Variables

Gender was found to be statistically significant for the entire group of officers and for married members only. As expected, women were found to be more likely to leave the military than men. This remains consistent with economic theory that suggests women are more likely to enter and exit the labor market more readily than men to raise families or to pursue other personal goals. Female officers who choose to maintain a career and a family may find the decision to sacrifice one for the other to be quite difficult. Policy makers may consider innovative approaches to

deal with this growing phenomenon, such as to increase the entering stocks of women to the military to compensate for what are likely to be increased loss rates. Another consideration may be to implement more extensive family support programs allowing women the opportunity to maintain both a military career and a family.

Age was also found to be statistically significant at less than the 10% level for the entire sample, for married members, and for women. As hypothesized, older members were more likely to stay in the Air Force. This suggests that age may be a suitable proxy for tenure, and as these individuals become older they are likely to maintain more stable career patterns.

For the model of women only, advanced degree attainment was found to be statistically significant. If a woman had a "Masters" or "PhD", she was less likely to stay in the military than someone with a "baccalaureate" degree. As suggested earlier, members obtaining advanced degrees may be confident of finding greater economic rewards or more challenging occupations in the private sector.

2. Work Related Variables

Work experience was found to be significant in all the models, except the one addressing men only. It was originally hypothesized that work experience would have a positive effect on retention, yet the variable consistently displayed a negative impact. Age and the number of years of

education were included in this proxy for work experience. While it seems likely that if age contributed positively to retention, experience should have also; the key to this result may be that most of these officers were about the same age, which was about 31 years. As noted in a study by Knapp, et al., [Ref. 1] the largest percentage of leavers from one particular organization were under the age of 29. As suggested earlier, this age group of individuals may be somewhat representative of younger workers who have higher migration rates, and are likely to move from job to job. Alternatively, older workers are more likely to display closer affiliation with an organization, and be less likely to quit. This group of officers with some eight to ten years of experience may be classified as younger workers displaying less affiliation with a single organization; whereas, officers with slightly more experience (eg: 11 to 13 years) may demonstrate greater job stability. This may be the point in time where these individuals begin to modify their values, and demonstrate more maturity through career development with one employer.

Another consideration may also be made. Since the group consisted of captains with four to 11 years of service displaying an average of nine years experience, this period coincides with the point in time when these individuals are considered for promotion to major. These officers must determine whether they will pursue a full career, devoting

an additional ten years of service to the military, or separate to the private sector. As these officers know that promotion vacancies to major (and looking forward to lieutenant colonel) are limited, they may decide to leave prematurely if they feel they are not competitively promotable in the present "up or out" system. They are likely to opt for alternative career paths in order to maintain their marketable skills.

The number of PCS moves an officer made was found to be significant for the model of all captains, married members, and women. As these individuals averaged slightly more than three PCS moves each, the variable was dichotomized into the reference group of those who had moved three or fewer times and those who had moved more than three times. Members who made three or fewer moves were more likely to leave the military than officers making more than three moves. It was theorized that career intention may be related to the number of moves encountered. Officers with spouses opting for work may have decided to separate due to these occasional employment disruptions. Alternatively, officers who have accepted the military as a way of life may have also accepted these occasional reassignments as part of that life. As previously stated, the number of PCS moves an officer encounters is an appropriate proxy for tenure.

3. Family Related Variables

The only family related variable found to be statistically significant was marital status for the model of men only. As expected, married men were found to be more likely to stay in the military than unmarried men. Married men displayed greater employment stability which seems plausible as they are likely to have additional dependents to support, not including the spouse. It may be noted that some 80% of the married members had spouses who did not work or worked less than 26 weeks during the past year. Couples with no children are more likely to have dual-incomes and may be less influenced by one income being disrupted, as compared to single income households. This further supports the notion that married members are likely to remain in the military as opposed to migrating from job to job which has less financial security.

4. Economic Variables

Total family debt was found to be statistically significant for the model of married officers and women only. As expected, members with a higher amount of debt (excluding home mortgages) were more likely to remain in the Air Force. This result may be similar to the marital status variable previously discussed. Married members may be less likely to disrupt their income flow if they hold a larger amount of debt, especially while providing for a family.

Total family income was found to be significant in explaining retention behavior of the entire sample of officers and also for unmarried members. The variable had the hypothesized impact on retention; the larger income a family had the more likely the officer was to separate prematurely. This again supports the theory that financial stability allows a military family greater flexibility in deciding to risk future income on civilian alternatives.

5. Career Related Variables

Both career related variables displayed highly significant results for each model estimated. Individuals who had looked for civilian employment in the past year were more likely to separate from the Air Force. Officers who were "satisfied" to "very satisfied" with the military way of life were also more likely to stay in the service than someone who was "very dissatisfied" to "somewhat satisfied".

It must be noted that these variables may not directly affect retention behavior, but may be merely precursors to attrition behavior. As previously discussed in Chapter III, individuals who display a dislike for their job or those who have looked for a new job in the recent past, may have already made the decision to leave their current employer.

B. STRENGTHS OF MODEL ESTIMATIONS

The results displayed in Chapter IV support the main thesis that Air Force officers with four to 11 years of service, especially pilots, demonstrate high attrition behavior. Most of the socioeconomic variables included in the estimations contributed to explaining retention behavior. The results also displayed the expected impacts on retention behavior, and were supported by economic theory and previous analyses reviewed in Chapter II. The models demonstrated good predictive capabilities. The "goodness-of-fit" of the model addressing all officers correctly classified some 70% of these individuals who either stayed or left the military. The model predicted some 22% better than chance the number of people who were likely to stay in the military, while it predicted 10% better than chance those individuals who were likely to leave. The models for married and unmarried members correctly classified 72% and 66%, respectively, of the officers who either stayed in or left the military. For the models of men and women, 70% and some 68% of the individuals were correctly classified overall.

C. WEAKNESSES OF ANALYSIS

The primary difficulty in the study consisted of determining the obligated service incurred by individual officers. As noted earlier, a considerable number of Active

Duty Service Commitments (ADSCs) exist, of which only a few could be readily calculated from the available information. The key to correcting this problem would be to have the ADSCs included in future surveys.

Another limitation was related to the dependent variable. No information was accessible as to the reasons people separated from the military. The only known consideration was for those who joined the reserves. It may be of interest to isolate and analyze the retention behavior of those who left voluntarily or involuntarily.

D. RECOMMENDATIONS FOR FOLLOW-ON RESEARCH

Future studies may look at cohort retention rates for these officers once the respondents with four years of service reach their eleventh year. These figures could then be compared with actual cumulative retention rates (CCR), such as the figures provided by AFMPC, to determine any trends or variation in behavior.

The areas noted as weaknesses of this analysis may also be precursors to follow-on studies. If these issues could be resolved by DMDC, then follow-on research may address other patterns such as comparing voluntary and involuntary attrition behavior. Also, future efforts may provide for more precision in isolating individuals who are actually eligible to separate.

As trends continue in society, such as more women entering the labor force in recent years, future studies may scrutinize changing retention and attrition patterns of men and women. These changing patterns from traditional family structures, consisting of a single income household, to dual income families are likely to impact future officer retention.

Another concern may address the experience issue which was notably significant in a majority of the estimations. The results from this analysis showed that as Air Force officers with four to eleven years of military service gained more experience, they were more likely to leave the military. If this represents a trend among Air Force officers to pursue other career paths after attaining some eight to ten years of experience, the impact of this loss of talent is likely to be detrimental for the future effectiveness and "corporate knowledge" of the military.

LIST OF REFERENCES

1. Knapp, Martin, et al., "Investigating Labor Turnover and Wastage Using the Logit Technique," Journal of Applied Psychology, v. 55, pp. 129-138, August 1982.
2. Ehrenberg, Ronald G., and Smith, Robert S., Modern Labor Economics: Theory and Public Policy, 3rd ed., Scott, Foresman and Company, 1988.
3. Air Force Military Personnel Center (DPMATO), Quarterly Officer Retention Report, point of contact, Lt Col Seidenberger or TSgt Herring, 30 June 1988.
4. Naval Postgraduate School Report NPS54-79-003, Marriage/Family Issues and Wife Styles Across Naval Officer Career Stages: Their Implications For Career Success, by C. Brooklyn Derr, July 1979.
5. Defense Manpower Data Center, 1985 DoD Survey of Officer and Enlisted Personnel, by Nileen Hunt, et al., 27 June 1986.
6. Kushell, Robert E., "How to Reduce Turnover by Creating a Positive Work Climate," Personnel Journal, v. 58, pp. 551-555, August 1979.
7. Michaels, Charles E., and Spector, Paul E., "Causes of Employee Turnover: A Test of the Mobley, Griffeth, Hand, and Meglino Model," Journal of Applied Psychology, v. 67, pp. 53-59, February 1982.
8. Studenmund, A. H., and Cassidy, Henry J., Using Econometrics: A Practical Guide, Little, Brown & Company, 1987.
9. Arnold, Hugh J., and Feldman, Daniel C., "A Multivariate Analysis of Determinants of Job Turnover," Journal of Applied Psychology, v. 67, pp. 350-360, June 1982.
10. Lamboni, Mark W., An Analysis of Reenlistment and Reserve Intentions of First-Term Enlisted Personnel, Thesis, Naval Postgraduate School, Monterey, California, June 1987.

11. Pindyck, Robert S., and Rubinfeld, Daniel L., Econometric Models & Economic Forecasts, 2d ed., McGraw-Hill Book Company, 1981.
12. Yogev, Sara, and Brett, Jeanne, "Patterns of Work and Family Involvement Among Single- and Dual-Earner Couples," Journal of Applied Psychology, v. 70, pp. 745-768, November 1985.
13. Westinghouse Public Applied Systems Report AD-A144467, Follow-On Study of Family Factors Critical to the Retention of Naval Personnel, by Ronald Szoc, and Barbara L. Seboda, 14 February 1984.
14. Anderson, Martin, "The All-Volunteer Force Decision, History, and Prospects," The All-Volunteer Force After a Decade: Retrospect and Prospect, Pergamon-Brassey's International Defense Publishers, pp. 10-14, 1986.
15. Center for Naval Analysis, Determinants of Labor Productivity in the Military, by Alan J. Marcus and Aline O. Quester, November 1984.
16. Air Command & Staff College, Air University Report 82-2380, Economic Indicators and Retention of Four to Eleven Year Air Force Support Officers: Is There A Correlation?, by Timothy P. Sutherland, 26 August 1982.
17. Air Command & Staff College, Air University Report 86-1455, Spouse Attitudes and Their Effect and Retention: An Analysis of The USAF Spouse Survey, by Leo E. Kringer, Jr., 1986.
18. Air Command & Staff College, Air University Report 82-0275, Changing Patterns of Air Force Families, by Larry W. Black, 4 August 1982.
19. Walter Reed Army Institute of Research Report AD-A146595, The Impact of Deployment Separation on Army Families, by E. W. Vranken, et al., August 1984.
20. Center for Naval Analysis Report AD-A128300, Research to Quantify The Effect of Permanent Change of Station Moves on Wives' Wages and Labor Supply, by Louis Jacobson, January 1983.
21. The RAND Corporation Report AD-A189073, Families and Mission: A Review of the Effects of Family Factors on Army Attrition, Retention, and Readiness, by Georges Vernez and Gail L. Zellman, August 1987.

22. Systems Research and Applications Corporation, Spouse Employment and the Retention of Air Force Officers: Some Preliminary Results, by D. Alton Smith and Marjorie E. Goon, March 1987.
23. Solnick, Loren M., "Marital Status, Children and Female Quitting," unpublished research paper provided to author, Naval Postgraduate School, Monterey, California, July 1988.
24. Payne, Scott E., "Analyzing the Effects of PCS Moves on Air Force Officer Spouse Employment," unpublished research paper, Naval Postgraduate School, Monterey, California, June 1988.
25. Air Force Regulation 36-51, Active Duty Service Commitments, on file at local Air Force Consolidated Base Personnel Office, Monterey, California, 4 April 1986.
26. Afifi, A. A., and Clark, Virginia, Computer-Aided Multivariate Analysis, Lifetime Learning Publications, 1984.

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